IN THE CIRCUIT COURT OF THE STATE OF OREGON
FOR THE COUNTY OF MULTNOMAH

The Estate of JESSE D. WILLIAMS, deceased, by and through MAYOLA WILLIAMS, personal representative,	)	
Plaintiff,	)	
vs.	)	No. 9705-03957
PHILIP MORRIS INCORPORATED,	)	Afternoon Session
Defendant.	)	Volume 16-B

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED that the above-entitled matter came on regularly for jury trial before the Honorable Anna J. Brown, Judge of the Circuit Court of the County of Multnomah, State of Oregon, on Monday, March 15, 1999.

APPEARANCES

Raymond Thomas, William Gaylord and Charles Tauman,
Attorneys at Law,
Appearing on behalf of the Plaintiff;

James Dumas, Walt Cofer, and Billy Randles,
Attorneys at Law,
Appearing on behalf of the Defendant.

Dennis Apodaca
Official Court Reporter
556A Multnomah County Courthouse
Portland, Oregon 97204
248-3180

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Monday, March 15, 1999

P R O C E E D I N G S

(Open court; jury not present:)

THE COURT: Are we ready to go on the record?

MR. COFER: Yes. The next witness, following Mr. Burnley, will be Dr. Richard Carchman. Among other things, Dr. Carchman will talk about the Next cigarette, the denicotinized cigarette foreshadowing.

The way that Philip Morris came up with the technique that allowed them to take the nicotine out of tobacco came as a result of their acquisition of General Foods. General Foods had a coffee process they used in Sanka called supercritical extraction, I believe.

Essentially, the story will be that the tobacco people working with the coffee people learned how to apply that technology which had been developed for coffee into tobacco, and that's how they were able to introduce --

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THE COURT: Why can't you simply say that Philip Morris acquired a coffee company that had a decaffeinating process from which we learned how to do X, Y, and Z?

MR. COFER: Well, I can. The only problem is I have a time line that, as a demonstrative, it says, "General Foods." It says, "Cafe Hauge," (phonetic) which is the German brand name for Sanka.

I can do one of two things. I guess I could try to cover it up with a Post-It.

THE COURT: Is there an objection to the General Foods?

MR. GAYLORD: Yes, and my suggestion was exactly what you said, Your Honor.

MR. COFER: Let me say that we have had --

THE COURT: Just cover it up. That way, you don't have a problem. There is no reason to spend time worrying about it. The jury doesn't need to know that it is a General Mills product, and it is really the science of decaffeination that you learned about having acquired a coffee company that counts.

MR. COFER: All right.

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THE COURT: What else?
Would you go count heads, please.
MR. COFER: Other than that, I'm ready whenever anybody is ready.
THE COURT: Ready for the jury. Bring them in.

(Open court; jury present:)

THE COURT: Good afternoon, jurors.
Mr. Cofer.
MR. COFER: Thank you, Your Honor.

DIRECT EXAMINATION
(Resumed)

BY MR. COFER:

Q. Mr. Burnley, if you would come back down, another point I want to make on the RL process -- let's put this up. I think we were able to get it so it would be more level. Okay.

You told the jury how the liquid portion of the tobacco is separated from the fiber portion of the tobacco, and then over here the liquid portion is reapplied; is that right?

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A. That's right.
Q. What happens to the nicotine content of the RL when the liquid is reapplied?
A. Well, there are some nicotine losses. The only way nicotine can get into the finished sheet, which is down here, is because it comes in with the raw material and because this process is pretty large, and because there is a lot of piping and so forth, there are some losses of solubles. And, of course, there is some nicotine in the soluble stream, so those losses are really lost forever.

There are a couple of other steps. The evaporator step, which heats the tobacco solubles, and so does the final dryer heat the tobacco sheet. And since nicotine is somewhat volatile, you lose some additional nicotine in those steps as well. So you do lose a little bit of nicotine as you process the stem into reconstituted sheet.
Q. So long and short of it, you have a hundred percent of the nicotine that is going in at this point. What percentage, on average, do you end up when you actually get to the RL?
A. I think there is about a 25 percent loss. So 75 percent of the nicotine was absorbed in the

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finished product.
Q. Also, if you were to analyze the nicotine content of the RL, how would that compare with the nicotine content that naturally occurs in the Burley or Bright tobacco that is used to make the RL?
A. Well, stem contains a lot less nicotine than the stripped portion of the tobacco. I think sort of a rule of thumb would be that there is about a third nicotine in RL as strip tobacco. Flue cured and Burley have 2 and a half to 3 and a half percent nicotine. Generally, there is just a little bit less than 1 percent nicotine in the RL sheet.
Q. Let me ask you one other thing about blended leaf. You told the jury that ammonia compounds are used here to release the natural pectins in the tobacco.
A. Right.
Q. Was the use of those ammonia compounds in BL to release natural pectins secret?
A. No. In fact, we had a couple of U.S. patents.
Q. In fact, if you step down to the monitor -- let me show you those. Let me show you

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what has been marked and admitted as Defendant's Exhibit 699, dated January 7, 1969. Can you see that?

A. Yes, sir.

Q. And, in fact, is this a patent that Philip Morris applied for and obtained for use of ammonia compounds in the BL process?

A. It is.

Q. Let me show you another exhibit, if I may. This is Defendant's Exhibit 701, patented November 21, 1967. Did I read that right?

A. Yes.

Q. And, again, is this a second patent that Philip Morris obtained for the use of ammonia compounds in the BL process?

A. Yes, it is.

Q. Okay. Let's move these so the jury can see. Why don't you stay down there, because I'm going to show you some documents on the Elmo.

Now, when you do RL, you don't use -- you don't release pectins, right?

A. That's correct.

Q. But you told the jury that you do, in fact, use ammonia compounds, right?

A. Yes.

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Q. You say you added them right here?
A. That's correct.
Q. Well, if you are not releasing pectins, why are you putting ammonia compounds in the RL?
A. Okay. Well, Philip Morris used the BL process exclusively until 1974. That was the only process we had for reconstituted tobacco.

The decision was made somewhere around 1972, 1973, to develop a new -- to use a new technology that was developed by Schweitzer, who was the inventor of the RL process. Of course, this process didn't require the ammonia DAP binder system. However, when you're changing tobacco types from one to another, you certainly want to do it in a way that doesn't change the taste of the bench product.

Consistency has always been extremely important to Philip Morris. Still is. So what the flavor chemists did was try to make the RL product, material taste as much like BL as they could. So they developed the flavor system that contains some ammonia compounds. They started with the one that was used as BL, which was diammonium phosphate. They also used some urea, so the combination of those two sheets made -- or

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substances made the RL sheet smoke more like BL, not exactly like it, but at least it is in the same family. So RL was increased on a personal basis and over time it was transparent to the consumer and the overall cigarette was identical to the 100 percent BL cigarette.

Q. Is it fair to say then the RL use of ammonia helped make the RL taste and feel more like the BL?

A. Absolutely.

Q. One other thing on RL. You talked about the removal of potassium nitrates down here.

A. Right.

Q. We talked about the crystallization process. I want to talk to you about NOD, or naturally occurring denitrification. Stay down here. I will show you a couple of others.

First of all, I want you to assume, Mr. Burnley, that through the deposition of Dr. Uydess, and here live in this courtroom, Dr. Farone testified that Philip Morris had perfected a process called naturally occurring denitrification, which essentially removed all of the nitrates from the RL process. Are you familiar with that process?

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A. I am.
Q. Also, I want you to assume their view that this process was, in fact, commercially feasible and, had it been implemented, it would have eliminated virtually all of the tobacco-specific nitrosamines. Okay.
I want you to assume that. All right. That was the testimony.
A. All right.
Q. Did you work on the NOD process?
A. I did.
Q. And when, approximately, was that work taking place?
A. My recollection is that we started in mid-1980, and my involvement ended about mid-1983, but the project continued into 1984.
Q. If you would turn and tell the jury how did that whole NOD come about?
A. Well, can I use one of my charts?
Q. Sure.
A. Well, I told you earlier that Philip Morris, in the late '70s, installed this process in the RL plant to remove potassium nitrate. It did this by a process called crystallization, which means that if you cool the

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liquid stream enough, it becomes saturated, in this case, with potassium nitrate. That means the liquid just can't hold any more potassium nitrate. It rains out or crystallizes out.

Well, after this process was installed and operating for a while, the plant noticed from time to time that there were no potassium nitrate crystals coming out of the centrifuge, which is shown right here. So R&D at that time was asked to come troubleshoot the process to see if they could figure out what was going wrong. And they did visit the plant and they actually measured the potassium nitrate concentration in the stream going to the KNO removal step, and they found that there was no potassium nitrate there. So, none being there, obviously this process couldn't remove any.

So they began trying to determine just what was going on. And one of the scientists observed in one of these tanks -- I'm really not sure which one it was, probably one not shown on here -- a brown gas coming off the tank. And brown gas is a telltale sign of certain nitrogen oxides. So the man's name was Bernie Semp, and he began to try to understand what was happening and

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he discovered that there were some microbes, some bacteria, bugs, if you prefer, that were naturally occurring on tobacco, and those bugs, under certain conditions, would actually, for simplicity, I will say, eat the potassium nitrate.

And the idea was then that, boy, if you could really control this process and control this naturally occurring denitration, control the microorganisms that are consuming the potassium nitrates, you might be able to develop a process that would remove a hundred percent of the potassium nitrate, and that's really how it started.

Q. Approximately how many people worked on that project to try to develop and commercialize NOD?

A. Well, I don't know exactly, but there were a lot of people involved, a lot of people in R&D, a lot of people in engineering. And if I add all of the technicians that were involved and all of the people that did analytical services that were involved, I would guess somewhere between, you know, 70 and 80 people probably involved.

Q. Could you give the jury a ballpark, how much money Philip Morris spent trying to develop

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and perfect that process?
A. Well, again, I haven't really gone back to try to pull those numbers together, but just salaries of that many people, plus the fact that we built a pilot plant, it had to be an investment.
MR. GAYLORD: Excuse me. This is speculation. I object unless he actually has a number. Answering by saying he doesn't know the answer.
BY MR. COFER:
Q. Could you give your best estimate?
A. Well, it had to be tens of millions of dollars.
Q. Let me ask you this: Is it fair to say that Philip Morris, both through money, equipment, personnel, devoted substantial resources into trying to perfect this process?
A. Without a doubt.
Q. Now, what else was going on at about this time? Was there something about a third line?
A. Yes. In the early 1980s or mid-1980s, Philip Morris needed additional RL capacity, and it was in the process of designing and building another production line. And we were working very

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hard in considering use of the de -- the NOD denitration process as a replacement for the crystallization process. We had to make that decision sometime in the spring of 1983.

Q. Okay. Here is the question I want to ask you, Mr. Burnley: Who made the recommendation that this NOD process not go forward?

A. I did.

Q. And why?

A. Well, it just wasn't reliable. There were a lot of problems that had to be resolved.

First of all, the process worked sometimes and it didn't work at other times. So the startup was unreliable. The rate of denitration varied all over the place. There were some times when potassium nitrate was removed at a very rapid rate, and there were other times it was removed very slowly. Sometimes it wouldn't work at all.

There were times when there were sort of byproducts or excretions of the bugs that produced certain organic acids, butyric acid, propionic acid, and these imparted various odors and tastes to the RL.

I can remember going down to the pilot

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plant, sometimes we would smell like goats and sometimes we would smell like gym socks. The byproduct generation combined with the unreliable reaction rates, combined with the unreliable startup just made the process not commercially viable at that time.

Q. Come on down. Let's move this. I want to show you a couple of documents from Philip Morris' files. Stand by the monitor, if you would, please.

Let me show you what has been marked as Defendant's Exhibit 706. It is a memo from J.C. Gomes to Mr. H.G. Burnley, Jr. That's you?

A. Yes.

Q. Subject: Status report NOD project, dated March 19, 1982. Correct?

A. Correct.

Q. Is that legible over there?

A. It is, yes.

Q. Let's look under "conclusions." "One, denitrification by bacterial fermentation has been achieved in the pilot plant, both by fed-batch and continuous mode operation."

I think you mentioned this, but did Philip Morris actually build a small-skilled pilot

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plant in an attempt to make this idea a commercial reality?

A. Yes, we did.

Q. Number 2, "Subjective indications" -- make sure I'm reading this correctly -- "of product quality and acceptability are favorable and official evaluations are in progress. However, quality and acceptability of product denitrification by bacterial fermentation has not yet been approved.

"3. Consistent denitration rate results have not yet been achieved in the pilot facility. This is primarily attributed to variations in feedstock composition, i.e., solids, nitrates, nutrients, inhibitors, et cetera, and excessive levels of contaminating organisms."

Turn and tell the jury what that means.

A. Well, as I said before, sometimes this process would operate at a high rate, sometimes it would operate at a low rate, and the researchers were trying very hard to figure out what the cause of that was. And their conclusions were that since tobacco varies from year to year, from lot to lot, depending on where you buy it, there may be different amounts of sugar and so forth in it.

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And because it comes from different places, there may be different soil microorganisms on the tobacco.

The combination of the nutrients of the bugs and the actual source of the bugs were responsible for the variation in reaction rate. Because you had different organisms sometimes and different food sources sometimes, the reaction rates weren't the same all the time.

Q. Let me ask you this, Mr. Burnley: At the time you had to make a call whether to use this process on the third line, had the excessive levels of contaminating organisms been solved?

A. No.

Q. Turn and let's look at the next paragraph, No. 4. "Successful process startup has been repeated in the lab several times, but only once in the pilot plant. This was done using pH adjustment and Inoculum Grown and harvested In sterll SEL."

What does that mean?

A. Sometimes you can start the pilot plant up and sometimes you couldn't.

Q. Is that a problem for putting it in commercial application?

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A. Absolutely. It absolutely has to work if you are going into commercial operation.

Q. Was Philip Morris ever able to solve the problems of sometimes it started and sometimes it didn't?

A. No.

Q. The next paragraph, Mr. Burnley, "Sterilization of the entire process feedstream will be required to control contaminants which produce unacceptable levels of organic acids. Primarily butyric acid."

And I will read the next one. "6, excessive levels of organic acids are unacceptable because of the odor and taste they introduced to the product."

Tell the jury what that means.

A. Well, it is pretty much what I referred to a little while ago. This culture was a so-called mixed culture, meaning you had different kinds of microorganisms. There was a thought if you could isolate just the microorganisms that were responsible for the denitration, you may be able to eliminate the byproduct generation of these organic acids.

It turns out that in order to do that,

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you have to sterilize the complete system and sterilize the feedstock to kill any microorganisms that might be there that could compete with the food and compete with the organisms that you needed.

So basically what he is saying here is we still haven't solved the problem of organic acid generation and the odor and taste problems it caused. One way to do that might be to sterilize the process and try to come up with a culture that was more specific to removing these nitrates.

Q. At the time that you had to make the call whether to incorporate this NOD on the third line, had those problems been satisfactorily addressed?

A. No.

Q. Let's look at, I think, the last two. The last one, 9, "The nutritional requirements in growth inhibitors for the desirable organism are not yet completely known."

Tell the jury what that means.

A. Well, it is the same thing, really. Same thing really. Again, the bugs lived off of the tobacco and because the food source was very variable, because the tobacco was a bit variable, that was just another problem.

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Q. I want to show you two more documents, so stay down there, if you will.

First, I want to show you what has been marked as Defendant's Exhibit 707. This is in evidence. This is a memo dated August 29, 1983. Do you see that date?

A. Yes.

Q. It is written by Ian Uydess and R.L. Dunn. Is that correct?

A. That's correct.

Q. Ian Uydess is Dr. Uydess, right?

A. Yes.

Q. He was one of the ones that worked on this project, wasn't he?

A. Yes, he was.

Q. Now, let me flip to the third page, the introduction. This, again, was a report titled "Mixed Culture Denitrification," so that's the NOD we have been discussing, correct?

A. Yes.

Q. I will read the highlighted portion: "Although considerable light has recently been shed on this topic, as a result of the recent experimental observations of the NOD laboratory and Dr. Hempfling, et al., a complete

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understanding of the relationship between the relative efficiency of denitrification and the variability of our SELs" -- which stands for strongly extracted liquid; is that right?

A. That's right.

Q. That's the liquid portion of RL?

A. Yes.

Q. -- "lies somewhere in the future."

Did I read that correctly?

A. Yes, sir.

Q. That's Dr. Uydess' report, right?

A. Yes.

Q. Now, let's turn to Defendant's Exhibit 705. Again, this is in evidence. This is a memo dated September 12, 1983, from Helmut Gaisch. Tell the jury who Helmut Gaisch is.

A. Helmut Gaisch was vice president of research at our research laboratory in Neuchatel, Switzerland. Their job was to basically provide R&D services for Europe.

Q. The letter was written to Bob Seligman. Tell the jury who Bob Seligman was in September of 1983.

A. Bob Seligman was vice president of R&D for Philip Morris U.S.A. in Richmond, Virginia.

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Q. Let me read a little bit of the first page. You might want to stand over here so the jury -- you might want to stand over here so you are out of the jury's way. Read along with me, if you would, Mr. Burnley.

"Dear Bob: Thank you for your letter; in particular, the first paragraph. I had a good look at the NOD paper, which contains a lot more information than had been compiled before. In the introduction, the authors say, for example, 'a complete understanding of the relationship between the relative efficiency of denitrification and the variability of our SELs lies somewhere in the future.'"

That report, of course, refers to a report I just showed to the jury, which is a report from Dr. Uydess; also correct?

A. Correct.

Q. Reading on. "I think this sums it up. There are many conditions outlined which must be observed, but they are not terribly well defined and seemed, to me, at least, not easy to be controlled experimentally."

Next paragraph, "The most important feature of any industrial process is its

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controllability."

I want you to tell the jury whether -- in your experience and your opinion, whether that's true. Is controllability important in commercial application?

A. Absolutely. If you can't control the process, you don't really have one.

Q. Still reading. "Parameters which spring to mind are temperature, pH, specific nutrients, et cetera. I know that the process runs and I know that biochemically interactions between two cultures are rather complicated. Where I see a problem, but I might be wrong, is how to keep the process on the rails."

Does that summarize your view where you were when you had to make a decision whether to install NOD on that third line?

A. Yes, it does.

Q. Now, let me ask you this: Did you want NOD to work?

A. Oh, absolutely.

Q. Is there any reason you can think of, had you been able to make NOD work, work consistently, is there any reason not to install it?

A. I can't think of anything. We had a very

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large investment in this effort. I mean, I had a personal investment in it. I had people working on the NOD project, and I wanted it to work as well as anyone else.

In fact, the company really didn't give up on NOD. When we had to make the decision for the third line of Park 500, the work continued for -- I guess I lost track of it somewhere in 1994, but the work continued for at least another year, and was finally abandoned by R&D.

Q. Stay down there. I want to switch topics, but I want to show you something.

Now, I am referring to Plaintiff's Exhibit 148. First, let me show you the plaintiff's exhibit, then I will put a more legible copy.

Plaintiff's Exhibit 148. Do you see that stamp?

A. Yes.

Q. "Facts you should know." And I doubt you will be able to read it. I will read it to you, and try to follow along. I'm asking you this in your capacity with the company.

"Fact No. 1: Philip Morris does not add nicotine to its cigarettes. The nicotine delivery

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of all commercial cigarettes is measured and disclosed to one-tenth of a milligram both in public releases by the Federal Trade Commission and in every advertisement for the last 25 years. In the end, Philip Morris lowers the amount of nicotine naturally occurring in tobacco by between 50 percent, in the case of a Marlboro; and 90 percent in an ultra low brand."

Mr. Burnley, is that a true statement?

A. Yes.

Q. "Fact No. 2: Philip Morris does not manipulate nicotine levels. We voluntarily opened our manufacturing operations to the Food & Drug Administration in a good faith effort to resolve the allegations that we add nicotine or control its level in our cigarettes."

I want to stop right there. The allegations were that Philip Morris controlled nicotine up, right?

A. That's correct.

Q. "Our manufacturing process includes over 400 quality control checkpoints and only two of them measured nicotine. In every case and with every brand we manufacture, the nicotine level in the finished cigarette is lower than the nicotine

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level of the original natural tobacco leaf."
Turn to the jury and tell them whether that is a true statement?
A. That is a true statement.
Q. "Fact No. 3: Philip Morris has not used patented processes to increase or maintain nicotine levels. Philip Morris, like every other corporation, applies for and obtains patents on virtually every innovation we pioneer. Philip Morris currently holds over 600 patents. They are publicly disclosed upon issuance through the U.S. Patent Office. Philip Morris has never used any of these patents to increase or even maintain nicotine levels in any of its products. In fact, the only nicotine-related patents Philip Morris has ever used are for the reduction of nicotine."
Turn to the jury and tell them whether that statement is true.
A. That is true.
Q. One more topic. Marlboro. We have heard a lot about Marlboro. Marlboro is the brand that Mr. Williams smoked. I want you to assume that we saw evidence that while the overall sales of cigarettes were declining, Marlboro sales were

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going up. Is it true that Marlboro is the most successful brand of cigarettes sold in this country?

A. It is true.

Q. Tell the jury in your opinion why that is so.

A. That's a $64,000 question. You ask almost any of us who work at Philip Morris, you probably get a different answer. I think everybody likes to take some credit for it.

I guess my answer is that Marlboro is a very high-quality product. We pay a lot of attention to make this product as consistent as we can from day-to-day, month-to-month, cigarette-to-cigarette. And we do that by taking extraordinary care in how we put the tobacco blends together.

For example, we blend tobaccos across many different growing regions from many different positions on the planet across many years. We work hard to make sure the blend is as consistent as possible, and you average out the variations that you have in crops from year-to-year, from growing region to growing region. So I think blend consistency is a big part of it.

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Another part is manufacturing consistency. I mean, we work very, very hard to make sure that the tobaccos are blended very accurately, that flavors are applied very precisely, that filters are manufactured very precisely, and that cigarette paper is manufactured very precisely, that the right weight is put into every cigarette. In fact, every cigarette is inspected many, many times in an extremely high speed.

We make sure that the packaging quality is very high quality, free of defects. Consistency in the way we make the product, I believe, is a big factor in the success of Marlboro. And I guess probably the last one is, I just think the advertising and the marketing of Marlboro has been very simple and very consistent over the years. And I think that's what makes Marlboro successful.

MR. COFER: Mr. Burnley, thank you very much. You may take the stand.

Cross-examination.

MR. GAYLORD: Thank you.

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CROSS-EXAMINATION

BY MR. GAYLORD:

Q. Mr. Burnley, do you think Marlboros are addictive?

A. I think any cigarette is -- I think it is tough to quit if you smoke cigarettes. If that's addictive, then that's addictive.

Q. In the facts you showed in Plaintiff's Exhibit 148, you stopped after the first three facts and he didn't ask you about No. 4. "Philip Morris does not believe cigarette smoking is addictive." Sounds like you don't necessarily agree with the company about that?

A. That's not the case at all. I am just -- I'm an engineer. I am not -- I don't really feel qualified to answer questions on addiction. I can only give you sort of a layman's view, a personal view.

Q. One of the things I want to do is spend a few moments learning where your expertise is and where it is not. So from time to time I will ask you that. I will ask a question whether something is within your knowledge or not. If I ask you something outside of your knowledge, tell me that,

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would you?
A. Sure.
Q. Has it ever been within your knowledge to know what any of the competitor companies have done and said about why they think Marlboros is the best-selling cigarette?
A. Sure. I have read some -- I have read some documents in concert with some of the litigation.
Q. Have you read the documents where some of the other companies have reverse engineered Marlboro and come to conclusions about what they think the ingredients are that sell the most?
A. I have.
MR. COFER: Excuse me, may we approach, Your Honor?
THE COURT: Yes.
(Discussion at the bench off the record.)
THE COURT: Jurors, would you step out to the jury room. Leave your notes here, please.

(Open court; jury not present.)

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THE COURT: Let me see if I can set the stage here so the record is clear what we're doing.

On direct, the witness was asked his opinion about why he thinks Marlboro is the success that it is. Mr. Gaylord just asked, in thwarting the opinions the witness expressed about why Marlboro is a success, whether he ever saw documents about other competitors' opinions on that subject, and the witness' response was that he had seen documents in connection with litigation.

Mr. Cofer approached and wanted to alert me to a potential objection -- to an actual objection -- the line of the questioning, to the extent it leads to inquiry about the R.J. Reynolds qualitative analysis which showed evidence of ammonia, the proportion of ammonia or the ammonia content in a Marlboro cigarette as developed by the RJR research.

We have had discussion about this particular document -- the exhibit number is?

MR. GAYLORD: 88, Your Honor.

THE COURT: -- before. And so far, I have sustained that objections.

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Out of an abundance of caution, and in order to give Mr. Gaylord an opportunity to lay the foundation for that, I have excused the jury so we can see where the question is going and what the witness will say, and I can have an intelligent basis, I hope, to rule on the objection.

Go ahead, Mr. Gaylord.

BY MR. GAYLORD:

Q. Mr. Burnley, you indicated you had some awareness of documents that -- reverse engineering of Marlboros by competitive companies.

A. Yes.

Q. Does that include a document from R.J. Reynolds about comparisons between Marlboro and Winston and some other brands?

A. Could I see the document?

Q. Yeah, you can. I'm going to ask you some more preliminaries about it. Let me show you the front of it.

A. Yeah, I have seen that one.

Q. That's the document entitled "Implications and Activities Arising from Correlation of Smoke pH With Nicotine Impact, Other Smoke Qualities, and Cigarette SELs"?

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A. Correct.
Q. For the record, I will represent that is Plaintiff's Exhibit 88.
Are you familiar with the contents of that document talking about market correlations and implications?
A. In a general sense I am. It has been a while since I have read it.
Q. And I will try to do this without belaboring these points for the moment, just to summarize some of those implications.
Is it part of your knowledge that the reverse engineering by R.J. Reynolds found that Marlboro had higher pH than Winston, and that they correlated that with increased amounts of free nicotine in the smoke and higher-need nicotine kick, and went on to say these differences in nicotine impact and other smoke qualities arising from smoke pH increases would be expected to give rise to differences in consumer response, hence, market performance, and found that their preliminary correlations strongly suggest this is the case and that the vigorous sustained growth in sales of Marlboro correlates closely with the increased smoke pH; hence, increased free nicotine

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and nicotine impact to those brands.

There is a lot more to this, but that basic conclusion is part of what you are familiar with from this document?

A. Yes.

Q. And when you expressed your opinion to the jury just a few moments ago about why you think Marlboro is the best-selling brand, you didn't mention these conclusions, but these are part of the information that you have at hand while you form your conclusions?

A. Well, that's partially -- it is partially true. It is true that I had seen the document, but I have held that belief about the success of Marlboro for a long time, and long before I saw that document.

Q. What basis, if any, do you have to dispute the conclusions that R.J. Reynolds drew about Marlboros' content?

A. Well, a couple. First of all, we have done some work looking at -- you know, as a result of all the litigation. We have done some work looking at smoke pH of our products with and without added ammonia, and we can't see any difference in our products that are made with the

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added ammonia, which is characteristic of BL and some of the RL removed.

The second thing is, look, all of our blends -- not all -- most of our blends are very, very similar. They all contain added ammonia, and those products don't sell as well as Marlboro. I wish they did. Benson & Hedges is basically the same blend as Marlboro. Unfortunately, it doesn't sell as well. So, to me, if ammonia were the secret to Marlboro, all our brands that contained added ammonia compounds would be as successful, and they are simply not.

I also knew that we made Marlboro in other places in the world, and it is an extraordinarily popular brand, and most of those products, or at least some of those products don't have added ammonia in it. I personally don't think that there is anything to the ammonia allegations and the correlations of ammonia to the success of Marlboro.

Q. Is it your belief that Marlboro does have higher ammonia levels than the competing American brands?

A. I haven't looked in a long while at the ammonia levels in other products, to tell you the

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truth.
Q. And what you were telling us just a moment ago, it sounded like you were saying that you don't think the ammonia difference accounts for the sales difference. So what I am asking you now, do you believe that there is an ammonia difference?
A. Like I say, I haven't really looked at them in a long time.
Q. Has it been your role with Philip Morris to do any of the research on things like ammonia levels and pH levels and smoke impact?
A. No.
Q. Are you familiar with research conclusions from Philip Morris testing, quote, the effects of cigarette smoke pH on nicotine delivery and subjective evaluations?
MR. COFER: What are you reading from?
MR. THOMAS: Exhibit 149.
MR. COFER: This is a different exhibit.
MR. GAYLORD: Yes, it is.
BY MR. GAYLORD:
Q. Are you familiar with Philip Morris' research conclusions to the effect that the higher the pH, the more rapidly nicotine enters the blood

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stream, and that cigarettes containing the base produced enhanced electrophysiological objective responses?

A. What document are you reading from?

Q. Exhibit 149, in evidence in this case, of January 24, 1994, Philip Morris research document.

MR. COFER: May I show him the document?

MR. GAYLORD: I will show it to him in a second. I wanted to know if he has heard about it.

THE WITNESS: I would like to see the document. I'm not sure.

BY MR. GAYLORD:

Q. Are you familiar with those conclusions?

A. No.

Q. Without the document.

A. (Witness reviewed the document.) Is this a Philip Morris document?

Q. It is a Philip Morris document.

MR. COFER: Actually, it is a partial document. The rotation of the document cites the public literature, which I think is being reviewed in that document. It is an incomplete document, I understand, pulled off the internet. But I think it did appear in the Philip Morris

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files.
THE COURT: Mr. Cofer, the witness needs to answer on his own.
MR. COFER: I apologize. I do apologize.
THE WITNESS: So what is your question about the document?
BY MR. GAYLORD:
Q. My question, first off, were you familiar with these conclusions by Philip Morris about the relationship between pH and impact?
A. I'm not aware of any real conclusions on Philip Morris' part about the relationship between pH and impact. I'm familiar with the term "impact," but I'm not aware that there was a correlation with pH.
MR. GAYLORD: Well, Your Honor, I guess I don't want to carry out my whole cross-examination without the jury here to hear it. I think the witness has acknowledged some personal knowledge of the other industry work that had been done analyzing the reasons behind Marlboros' phenomenal sales, and I think that opens the door to Exhibit 88, or at least the contents or subject matters of Exhibit 88, which he acknowledges having knowledge of.

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He has put his opinion on the subject in evidence. I think we are entitled to delve behind it and see what else he might know that would suggest a different opinion.

THE COURT: If a knowledgeable person from RJR was here, the evidence is relevant. It is a hearsay objection that was originally lodged. It is still hearsay. The witness has not acknowledged having relied upon RJR's word as part of his opinion. He is aware of it as part of the litigation. It doesn't make it any less hearsay.

MR. GAYLORD: May I suggest -- I think what I am doing is offering it for its impact on this witness and his notice of it.

THE COURT: You don't have any basis that it has had any impact on the witness. The witness' opinion, by his description, preexists becoming aware that RJR had done this analysis. It is still hearsay.

MR. GAYLORD: He has expressed his opinion today as a present-day state of mind. I think I should be allowed to ask him what other things he knows that would suggest to the contrary, whether he rejected or accepted them.

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THE COURT: As long as those other things are admissible. In this form, it is hearsay. You are wanting to offer it for its truth, Mr. Gaylord, that R.J. Reynolds has come up with this analysis of the ammonia content, that he knows that they have created that document, doesn't make it any less hearsay. There is no foundation laid that the witness relied upon it or that it was used in any way in rendering his opinions on direct or so far on cross. It is still hearsay.

MR. GAYLORD: I guess clarification. Without the document, am I allowed to inquire about his knowledge of the information that he's aware of, that he admits he is aware of from R.J. Reynolds, or whether or not he took that into account in the opinion he has expressed?

THE COURT: Ask him now. See what the answer is.

BY MR. GAYLORD:

Q. Has this information from R.J. Reynolds played any part in your opinion that you have formed here?

A. No. I told you a minute ago it did not. I held that belief about the success of Marlboro

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for a long time.
Q. On that basis, did you reject any of this information in favor of the opinion that you have expressed?
A. Look, I'm not familiar with the work R.J. Reynolds did. I read the report. I don't know what the experimental protocols were. I don't know whether it was done accurately. And it, frankly, conflicts with some of our own research.
THE COURT: Mr. Cofer, do you have anything for the record?
MR. COFER: No, Your Honor. The only thing I would add, I think this is beyond the scope of this witness' testimony. He was called to talk about the manufacturing processes. RL and BL specifically. He was called to talk about the addition of ammonia.
THE COURT: You asked the witness why he thought Marlboro was the success that it was. That's a very broad question, and it gets to be probed, but only with admissible material.
MR. COFER: I have nothing further to add.
THE COURT: Bring the jury back, please.

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(Open court; jury present.)

THE COURT: Thank you, jurors.

Mr. Gaylord.

MR. GAYLORD: Thank you, Your Honor.

BY MR. GAYLORD:

Q. Mr. Burnley, I want to go back to an early statement that you made, I think before the lunch break this morning, about Philip Morris not being any different than other companies, other businesses with respect to tensions between their research efforts, and may I summarize kind of the practical side of the business?

A. Yes.

Q. Do you recall that subject?

A. Yes, I did.

Q. Do you know of any other manufacturing business where one of the tensions involved in implementing any new technology might be that marketing, that technology would require an admission that the prior products were dangerous?

MR. COFER: Objection, beyond the scope.

THE COURT: Overruled. Go ahead and answer.

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THE WITNESS: I'm not aware.
BY MR. GAYLORD:
Q. The boards that you showed the jury and went through, I think it was flow charts --
A. Yes.
Q. -- and they're -- they are flow charts both in terms of kind of the graphics that they are and in terms of what the process is they are showing us. It is sort of a manufacturing flow, isn't it?
A. Yes, it is.
Q. And would it be fair for us to visualize these processes as they are carried out in the factory as industrial manufacturing processes?
A. Yes.
Q. You used a couple of different terms, and I want to make sure I'm following along with you.
I think the BL process is the one you referred to as a casting process.
A. Yeah. We call it a cast sheet process.
Q. I got the right word, "casting"?
A. Yes.
Q. And that's descriptive of the fact that apple butter-type material is spread out on the cookie sheet and it is referred to as casting it?

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A. Yes.
Q. And I pictured that as sort of an assembly line kind of thing. In other words, it moves past like a continuous moving belt?
A. It is that continuous process. It is not an assembly line in the fact -- in the sense that you have people at various parts of the process putting something together. It is a continuous process.
Q. Okay. When that's actually taking place, somebody could walk along the side of it and see the processed material moving along through its processing?
A. Yes, except when it is in a closed tank or inside one of the dryers.
Q. Okay. And then the reconstituted leaf, that's the RL?
A. Yes.
Q. Is that what you call it, reconstituted leaf?
A. Yes.
Q. That's a paper-making process?
A. Yes.
Q. And when you say that is a paper making process, would we be correct in visualizing it

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very much like a pulp mill, a paper-making factory?
A. It is very much like a paper mill, yes.
Q. And, in fact, wasn't that developed around the same technology that is used to make actual paper?
A. Yes.
Q. And just as in actual paper, fiber is spread out on a wire mesh and that becomes the base of the paper, and a variety of squeezings and dryings and heatings and chemical applications are done to it?
A. I didn't understand your question.
Q. Is this paper-making process one in which the fiber is laid down on a wire mesh?
A. Yes.
Q. And that moves along on a continuous belt?
A. Yes.
Q. And it goes through rollers that squeeze it, or dry it, or heat it, or what have you?
A. That dry it, yes.
Q. Does it have chemicals added to it at various stages?
A. Well, it has -- the tobacco solubles are

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reapplied, and there are some flavors and humectants that are reapplied.

Q. I want to come back to that. I want to figure out what those two terms mean.

For the first thing that you said, the tobacco solubles, would it be a correct visualization to say that the tobacco parts that go into the RL, and first off, let me say, is that where you told us about these being the stems and the little pieces of the lamina?

A. Yes, it is.

Q. We think of those as remnants after the main tobacco is taken away from the leaf?

A. They are just exactly as I described it, stem and little small pieces of tobacco that break off in the process.

Q. Okay. But the way you get those is by taking the main part of the leaf away to use as ordinary tobacco?

A. That's correct.

Q. And you take what's left and you grind it all up so you get the last usage of everything that came from the tobacco plant?

A. Well, we do reuse the stem. We do reconstitute the stem and small tobacco pieces,

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sure.
Q. And then you separate that into the fiber that goes down on the screen and does the paper-making thing?
A. Yes.
Q. And the solubles, which is everything that you could get out of it but the fiber?
A. Yes.
Q. And am I correct that as this process goes forward there comes a time when you take all those solubles and put them back in?
A. Yes, that's right.
Q. And one of the goals of the process is to put as much solubles in as you can?
A. Yes.
Q. You told us that you lose some of the things along the way, but the idea is to lose as little as you can.
A. That's correct.
Q. The result, when you are through, is this sheet of material that you showed us, a little bit of which has been transformed into a paper shape, but it has as much as possible everything in the material that you started with?
A. Yes.

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Q. Including all the nicotine was there?
A. The nicotine that is not lost is there, yes.
Q. And you told us that there are some things added to it and you gave us two words, flavorants and humectants.
A. Yes.
Q. The humectants are propylene glycol and glycerin?
A. That's correct.
Q. Those are chemicals added to it for adding a certain degree of moisture content?
A. That's correct.
Q. And flavorants is a batch of stuff, isn't it?
A. Well, yeah, they are flavors. They contain some chocolate and some licorice and sugar. One of the sheets contains ammonia, diammonium phosphate, and some urea.
Q. And those are two of the so-called ammonia compounds that we talked about a little bit?
A. Yes.
Q. Have you worked in the flavor department?
A. Well, all of the manufacturing plants

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have what are called flavor kitchens where flavors are prepared. Cigarette factories have them. The RL plant has a flavor kitchen. The BL plant has a flavor kitchen.

I have -- yes, I have been in all of the flavor kitchens that the company has.

Q. Have you ever worked in the part of the research and development department or end of the company where people study what they can put into flavorants to have certain effects on the smoke of the cigarette?

A. Well, I have never worked in flavor technology, if that's your question. I have -- I worked in R&D for almost ten years, so I certainly have been exposed to some of their work, but I haven't directly worked in flavor technology.

Q. Do you know how many ingredients there are in the flavorants for your commercial cigarettes?

A. Off the top of my head, I don't have any idea.

Q. The word "flavors" or "flavorants" seems to be used to increase a variety of different ingredients, sort of a recipe of different ingredients; is that fair?

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A. Yeah, I think that's fair.
Q. And when those are added to the process of making these reconstituted kinds of tobacco products, are they added as a recipe? In other words, there is a vat there and it is called "flavors" and somebody adds that to the mix at some stage?
A. Yes.
Q. And what goes into that recipe has been developed and studied by people who are specialists in that field?
A. Yes.
Q. Would it be fair to think of the flavorants as a chemical process?
A. Well, you know, actually -- flavor chemists -- the whole flavor chemistry area is a very sort of arty area. People that work in flavor technology have a lot of experience with different types of flavors that are available from flavor houses, and there are textbooks written on flavors and so on and so forth. It is a very experiential-type position. It is a very arty position where people who are working in that area obtain samples of different flavors and they mix flavors trying to achieve a certain result, and

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there is a great deal of trial and error involved in coming up with flavor systems for cigarette products, just like there are -- it is not a lot different than other industries. People who are trying to create flavors for perfumes and other things operate pretty much the same way. It is not an exact science, unfortunately.

Q. Do the people that work in the flavor development have chemistry degrees?

A. Some, I'm sure, do. Some do not.

Q. Do the people who work in the flavor department ever work with R&D people to incorporate the technology that has been developed in testing the impact of different kinds of constituents in cigarette smoke?

A. Well, flavor technology is part of R&D.

Q. The flavor that results from a given cigarette or smoke is a combination of presumably all the different ingredients in it?

A. Yes, it is.

Q. So the ammonia, or DAP, diammonium phosphate, or urea that is added, will have some impact on smoke flavor, and that has to be taken into account?

A. Yes.

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Q. Are you familiar with how the ammonia contents of, for example, Marlboro compare to other cigarettes on the market?
A. Not off the top of my head. I would have to check.
Q. Do you have a general awareness that the ammonia content in Marlboro is higher than in other cigarettes?
A. You know, it is my assumption, but I really haven't checked the ammonia soluble -- ammonia concentration in other products in a long time. But that's my assumption.
Q. Is it within your knowledge or expertise to talk about whether the ammonia that is in the Marlboro sweeps over the tobacco as it goes through the rod and releases free nicotine in a gaseous phase?
A. I'm not -- you know, I'm not an expert in physical chemistry or theoretical physics that you are talking about.
Q. Okay. Is your expertise such that you can comment on whether ammonia raises the pH of the filler in Marlboro cigarettes?
A. You know, I'm sure if you added -- ammonia is a base. I am sure if you added enough

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ammonia, it would raise the pH of filler. At the levels Philip Morris is using ammonia, and because of the buffing capacity of tobacco, I don't believe it has any sub -- any effect on the pH of the filler.

Q. Okay. Would you disagree with research done in Philip Morris and published in Philip Morris documents that suggests that the effect of raising pH in Philip Morris cigarettes increases the speed or rapidity with which nicotine enters the bloodstream and produces enhanced electrophysiological and subjective responses?

A. You are pretty far outside my area.

Q. You wouldn't disagree with that if that appeared in Plaintiff's Exhibit 149, would you?

A. I would have to read it and study it. I'm not sure.

Q. Just one question, kind of straying from the others. I thought I heard a discussion with you this morning about whether both BL and RL, whether they are or are not involved, both of them in, for example, Marlboro?

A. They are.

Q. If the jury had heard from prior

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witnesses that both of them were in Marlboro, you wouldn't disagree with that?

A. Both RL and BL are in Marlboro regular cigarettes. BL is not in Marlboro Menthol. I'm not sure, but I don't believe it is in any of our menthol products.

Q. I want to talk for a moment about nitrates and nitrosamines. You said that there was a Swiss scientist who reported that nitrogen oxides were harmful, just to bring up a subject. Is that a correct summary of something you said this morning?

A. Yeah, I think I said that Dr. Herzfeld, who was a Swiss scientist, identified certain substances in cigarette smoke that were, from his point of view, problematic from a health point of view. Nitrogen oxides were on that list.

Q. Does nitrogen oxide include nitrosamines?

A. No.

Q. Is the concern about the content of nitrogen oxide that they transform into nitrosamines in the smoke?

A. Not to my knowledge, no.

Q. Is the concern about nitrates in the tobacco that they go through pyrolysis in the

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burning process of tobacco and produce tobacco-specific nitrosamines?

A. Well, here again, you're getting pretty far outside of my area of expertise. It is my understanding, I have been told, that most all of the nitrosamines that are in cigarette smoke are there because they are already in tobacco, and they are not really formed on combustion. But I'm not an expert.

Q. Let me skip ahead for a moment for another subject I was going to get to later.

You talked about the NOD project.

A. Yes.

Q. Naturally occurring denitrification --

A. Right.

Q. -- project. That was a project to use bacteria found in association with tobacco as a means of reducing or eliminating the remaining nitrates in the tobacco?

A. Yes.

Q. Let me see if we got that in context.

First off, Philip Morris was already using crystallization to eliminate about 90 percent of the nitrates?

A. Well, I don't think crystallization

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removes quite that much. My recollection is it removes about 60 percent of nitrates.

Q. Okay. You disagree with the research scientists who were working on the NOD project if they said it was 90 percent?

A. Yes.

Q. Would you disagree with the proposition that the NOD project was geared towards eliminating the rest of it, whatever it was?

A. Yeah. That was -- that was the objective, to try to remove all of the potassium nitrate that was present.

Q. And to the extent that the line started successfully and it functioned correctly, it did that, didn't it?

A. Well, there were a couple of occurrences in the pilot plant where we were able to start up and able to sustain operation, but on subsequent trials to restart the plant we had an enormous amount of difficulties. Sometimes you could start it, sometimes you couldn't. Sometimes the nitrates would be consumed rapidly, sometimes they would be consumed very slowly. Sometimes they generated off-odors and off-tastes in the products.

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So, you know, if it works once in a while, that's just not good enough. It has to work every time.

Q. Okay, Mr. Burnley, now let me focus the question I am asking you here. Right now I'm not asking reliability or controllability, but I am just going to ask you this: If the scientists who worked on that project told us that it was a success to the extent that there were times at least when it actually eliminated the remaining nitrates, do you disagree with that?

A. No, I don't disagree with that.

Q. And with respect to the decision-making about that project --

A. Yes.

Q. -- were you a person who had any real knowledge of what the health risks were that were at stake in the effort to remove all the nitrates?

A. Well, I knew that nitrogen oxides were on the Herzfeld Index, and it was a substance that health authorities were concerned about. And it was our objective to try to remove as much of that as possible. So, to that extent, I was aware.

Q. Well, did you know that the reason for removing the nitrates was to reduce or eliminate

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tobacco-specific nitrosamines?
A. No.
Q. You disagree with that, or was that outside your knowledge, or what?
A. Well, to be very honest with you, I have heard -- I really don't recall hearing of any discussion of TSNAs in conjunction with the NOD project.
I will also tell you it is my understanding that most of the nitrosamines that are transferred to smoke are there because they are already in tobacco and are not created on combustion. It is not to say that some may not be created on combustion, but the vast majority of them are transferred because they are already in tobacco, tobacco and smoke.
Q. Is it your belief that those things are just naturally occurring in tobacco smoke and there's not much anybody could do about it?
A. I didn't say there wasn't much anybody could do about it. In fact, Philip Morris has done a great deal of research today to try to eliminate the formation of nitrosamines in tobacco.
Q. Is that because tobacco-specific

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nitrosamines are known to be carcinogens?
A. Again, I'm really not that much of an expert. I'm told that TSNAs, or at least some TSNAs are animal carcinogens.
Q. Is it fair to say that you are familiar with TSNAs as well-known substances because they are said to cause cancer?
A. Yeah. I'm familiar with them, because public health authorities have pointed to those as being problematic and being a health concern.
Q. Okay.
A. Sure.
Q. And that was something that was known and had been pointed to as cancer-causing agents before this time period we have talked about when the NOD project was stopped?
A. I don't really know.
Q. If I understand where we are on that subject then, you made the decision that the NOD project was not good enough to go forward with, but in making that decision you didn't have any appreciation of what nitrosamines meant to the health concerns about smoking?
A. I wasn't aware that this project was undertaken with the expectation of reducing

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nitrosamines. But I will add, whether or not that was true, you still have to have something that works in order for it to have the intended purpose.

Q. If that was the purpose of the project, according to the people who worked on it, you don't disagree with that?

A. I don't disagree with what?

Q. That the purpose of the project was to reduce nitrosamines.

A. Well, I was associated with the project for quite a while, and I certainly never heard that as an objective for the project.

Q. Let me turn to one other subject now.

You talked about nicotine a fair amount, and I want to make sure we get an understanding of how nicotine plays a role in the processing and development -- or manufacture, I should say, of these processed products that go into the cigarette.

A. Okay.

Q. You are indicating to us that the nicotine that comes in the tobacco is a natural product and it is just whatever is in the tobacco.

A. Yes.

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Q. Is that fair?
And then you told us in making reconstituted leaf and blended leaf the solubles, including the nicotine, are taken out, and then in both instances they are put back in, aren't they?
A. No, that's not correct. In the BL process, solubles are not removed and added back. They are in the RL process.
Q. Okay. My mistake. I'm way out of my league to be talking about this.
In the RL process, you take the solubles out and put them back in?
A. Yeah.
Q. And as much as possible, put all of them back in?
A. Yes.
Q. In the BL, you don't remove them, the thing that you cast on the cookie sheet contains solubles and fiber?
A. Yes.
Q. You have a pretty good idea how much nicotine is in each of the parts of these products that go into the cigarette, don't you?
A. Sure. With all of the blending that the company does, yeah. Sure.

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Q. You have a pretty good idea, as you sit here, what percent of the basic tobacco leaves, Burley or flue-cured, or the Turkish tobacco, oriental tobacco, you know what percentage of those is generally nicotine, don't you?

A. Yes.

Q. And what is that, 2 to 3 percent?

A. Yeah.

Q. And you know, because it is a manufacturing process and because a couple of different stages the alkaloids are actually measured, how much nicotine results in RL and BL, don't you?

A. Well, actually, we're not measuring the alkaloids during the manufacturing process. There are two possible places that alkaloids are measured. One is -- and, actually, we don't even do it anymore. One is after the tobacco is purchased, the leaf department used to characterize the chemistry of the tobacco and measure a lot of things and put it in a database. They have since stopped that practice.

The only other place that alkaloids are measured are in the finished product after it has been made and, in fact, it is really an audit.

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Not only after it has been made, but after the product has been shipped.

Q. Are you familiar with the TLA testing process?

A. Yeah, that's what I was just referring to.

Q. Okay. That's still being done on blended tobaccos?

A. You know, I think it is still being done on -- yes, I think it's still being done on the blend of Bright and Burley. Burley tobaccos, Bright tobaccos. I'm not quite sure about oriental tobaccos. But on the blend of those tobaccos I believe some frequency it is still being done. I can't recall what frequency it is being done. Once a quarter, or once every six months, or something like that.

Q. Okay. It is probably part of a thing that you told us about consistency, isn't it, that you have to at least occasionally check things like that to make sure that you are making cigarettes the same way you were a few months ago?

A. Well, I will tell you, the real key to a consistent blend is the strategy that the leaf department uses and blending tobacco across

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various growing regions, blending tobacco across the number of crop years, and blending tobacco across different stalk positions on the plant.

Over the years, experience has been if you do this, you can blend out changes due to changes in crop year characteristics caused by temperature differences, if you have a dry season, a wet season, so on, so forth. I think a lot of the TLA stuff that the leaf department did in the early days, the reason they stopped, in fact, was they found it pretty useless that the blending practice that they employed insured a pretty consistent blend.

Q. At any rate, for whatever reason, TLA measurements are taken, and that includes measuring the alkaloids?

A. Yeah. I don't believe it is done on individual braids of tobacco anymore. I believe the blends it is done on some frequency.

Q. The alkaloids give a pretty good idea about what the nicotine level is?

A. Yes.

Q. And, generally speaking, the nicotine level in the blends is what?

A. It is around 2 percent. I'm talking

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about the blend, after it includes oriental tobacco and the two sheet components I'm talking about, but the nicotine content is roughly about 2 percent.

Q. Isn't it 1 percent or a little bit less in the RL?

A. Yes.

Q. Isn't that about exactly what your company has tested and found to be the optimum level of nicotine for satisfaction for the addicted smoker?

A. I'm have no idea.

Q. You are not familiar with any of the testing and documentation that your company has done on the optimal levels of nicotine and smoke?

A. I'm not aware of it.

Q. You never heard the concept of providing an optimum level of nicotine for satisfaction?

A. I can't say I have never heard of it, but I don't recall anything specific.

Q. Were you around during the time when efforts were being made to reduce total tar and calculations were made to figure out how much nicotine needed to be preserved in order to have an effective salable cigarette, despite lowered

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total tar?
A. No, I don't remember that.
MR. COFER: Excuse me, I object to this line as beyond the scope.
THE COURT: I'm inclined to agree, unless I'm missing something, Mr. Gaylord.
MR. GAYLORD: Unless I think of another question, that's as far as I'm going with it right now, anyway, Your Honor. If I do, I will come up and talk to you first.
THE COURT: Okay.
BY MR. GAYLORD:
Q. Mr. Burnley, is it within your knowledge and expertise to answer any questions about whether the cooked flavors that are added to Marlboros include nicotine analogs?
A. It is not.
Q. You are not familiar with pyridine or pyrazine as ingredients added in the flavorants of cigarettes?
A. No.
Q. One way or another?
A. No.
MR. GAYLORD: Thank you.
THE COURT: Redirect.

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MR. COFER: Just a little bit, Your Honor.

REDIRECT EXAMINATION

BY MR. COFER:

Q. Mr. Burnley, you were asked about Plaintiff's Exhibit 149 entitled "The Effects of Cigarette Smoke pH on Nicotine Delivery and Subjective Evaluations." Do you remember that?

A. Yes.

Q. You were asked whether you would defer to the views of the researchers that did that work, right?

A. Yes.

Q. Would you also defer to the researchers' statement that the argument that bases -- and base -- ammonia is a base, right?

A. Yes.

Q. "The argument that bases are added to increase the nicotine delivery above normal levels is entirely specious." Would you defer to that?

A. I'm not really sure I understand your question.

Q. What does "specious" mean?

A. Irrelevant.

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Q. Makes no sense?
A. Right.
Q. So if that very document that the plaintiffs have read to you and asked whether you would defer to the researchers and the statement, "The argument that bases are added to increase the nicotine delivery above normal levels is entirely specious," you wouldn't quarrel with that, would you?
A. No.
Q. In this case the Complaint says that Jesse Williams began smoking Marlboro cigarettes in 1955 and continued them up through 1997. Were you aware of that?
A. Yes.
Q. When Philip Morris started using blended leaf in the mid to late 1950s, and again when it started using RL or reconstituted leaf in the 1970s, what effect did that have on the nicotine level of the Marlboro cigarettes Mr. Williams was smoking?
A. It should have decreased.
Q. Would the nicotine level of Marlboro cigarettes be increased if you just use lamina instead of also using reconstituted tobacco?

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A. Sure.
Q. Would it go up a bunch?
A. Depends on what the rest of the cigarette construction was like, but, yeah, there would be considerably more alkaloids available in the tobacco.
Q. Two more questions: Mr. Burnley, are there any controls or specifications for the pH of cigarette filler or pH of cigarette smoke in the manufacturing process?
A. No.
Q. Is the pH of cigarette filler or the pH of cigarette smoke measured at Philip Morris in order to control its manufacturing process?
A. No.
MR. COFER: That's all I have. Thank you.
MR. GAYLORD: Before he leaves, may we approach?
THE COURT: Yes.
(Discussion at the bench off the record.)

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RECROSS-EXAMINATION

BY MR. GAYLORD:

Q. Mr. Burnley, the sentence that was just read from Plaintiff's Exhibit 49, I'm going to read the rest of that paragraph and ask you -- excuse me.

Plaintiff's Exhibit 149, for the record. The sentence that Counsel read was, "The argument that bases are added to increase the nicotine delivery above normal levels is entirely specious."

The rest of the paragraph is as follows: "That same amount of nicotine is delivered whether the smoke is acetic, basic, or neutral. Only the form, not the amount of nicotine is changed. To illustrate, a study was conducted on nicotine aerosols where subjects inhaled the same amounts of nicotine at pHs of 5.6, 7.5, and 11.0. It was found that higher peak concentrations of nicotine in blood were achieved at higher pHs. Since the amounts of inhaled nicotine were the same, the results indicate that the higher the pH, the more rapidly nicotine enters the bloodstream. Eventually, of course, all of the nicotine,

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regardless of pH, would enter the bloodstream. Only rate of entry is pH dependent."

That's the rest of that paragraph.

Is that part of the knowledge that you have about the effect of changing pH according to Philip Morris research?

A. You are really in an area that is way outside my expertise. Those pHs are -- pHs you read off aren't in the realm of normal cigarettes.

MR. GAYLORD: That's all, Your Honor. Thank you.

THE COURT: Anything else, Mr. Cofer?

MR. COFER: Well, I guess I should read the first paragraph, so we have read the whole thing.

REDIRECT EXAMINATION

BY MR. COFER:

Q. "The pH of American blend cigarette tobacco filler is approximately 5.5. The pH of cigarette smoke is approximately 6.0. With a pH of 6.0, virtually all of the nicotine is protonated."

Does "protonated" mean bound?

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A. Yes.
Q. "In order for a substantial amount of nicotine to exist in the unprotonated state, the smoke pH would have to be around 8."
Have you read this document recently?
A. You know, I may have seen that document. I have read a lot.
Q. Are you a pharmacologist?
A. No.
Q. Are you a toxicologist?
A. No.
Q. Are you an addiction expert?
A. No.
MR. COFER: That's all I have. Thank you.
MR. GAYLORD: We will leave the last two paragraphs for argument, Your Honor.
THE COURT: Thank you, Mr. Gaylord.
Thank you, Mr. Burnley. You may step down.
We will take the afternoon recess, jurors. 15 minutes, please.

(Open court; jury not present.)

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THE COURT: Okay. 15 minutes.

(Recess.)

(Open court; jury not present:)

MR. COFER: Your Honor, we do have one matter to take up.

THE COURT: All right.

MR. COFER: There are some documents that we want to use in the examination of Dr. Carchman. They were on our Exhibit list. Hearsay objections were sustained to a number of them.

The rulings, as I understand, it was that we could offer a redacted version to show notice. It is not offered for the truth of the matter asserted, but rather for its influence on Philip Morris' State of mind. There are things like what people are saying in the scientific literature about cigarette smoke and how we are responding to it.

We provided this morning plaintiff's counsel with copies of the proposed redactions,

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and we are at the point now where we are starting the examination and I want to use them, basically.

MR. GAYLORD: Your Honor, I'm a bit embarrassed by my state of awareness of this. I talked with Mr. Coon about this this morning. I thought I had a grasp of what we were doing and what the history was.

Mr. Randles just informed me of some more history. It has already been brought up, and there have been discussions about the Court's position on it and instructions to redact, and I'm not sure I can do justice to our position. I could call Mr. Coon right now.

THE COURT: Let's do this. Why don't you hand me what it is that I'm working with, somebody.

MR. THOMAS: Do you have an extra copy for the Court?

MR. COFER: In here, we do.

The answer is we will have it assembled for you very quickly.

If you want to hand her yours, I will pull another copy.

MR. GAYLORD: I don't have one that

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doesn't have some pencil markings on it with instructions to me about what to say.

THE COURT: We wouldn't want to read your instructions, Mr. Gaylord, but I do need to have in front of me the defendant's exhibits in their redacted form.

MR. COFER: We're pulling them right now, Your Honor.

I understand 683 is not an extra copy. I need that one. These are extra copies.

THE COURT: All right. I have been handed 683, 637, 685, 686, 687.

Mr. Randles, would you please state for the record your recollection where we have been on these exhibits and what is the purpose for which the defendant would be using them.

MR. RANDLES: Thank you, Your Honor.

Here is where we were: We offered these, which are published articles in scientific literature. Mr. Coon made a hearsay objection. The Court sustained his hearsay objection to the extent they were offered for the truth of the matter asserted.

I responded that what we really wanted to offer these for was notice to Philip Morris,

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evidence that these things were said in the scientific literature and to help put in context the reasonableness of Philip Morris' actions in response to what was said.

The Court then directed me that these would be confusing to put in their entirety and overbearing, if you will, to the jury for that limited purpose of -- and what we should do is go back and redact them down to just the portions that went to notice.

So now we have brought them back in redacted form in compliance with the Court's directions, and these are not being offered for the truth of the matter asserted but merely for notice to Philip Morris of what was being said in the scientific community, and thereby to put the reasonableness of our conduct into context.

THE COURT: And what has Mr. Coon told you to say about these things, Mr. Gaylord?

MR. GAYLORD: Well, Your Honor, I think our position is, I will do the best I can to sort of overview it and treat them all the same.

There are some distinctions I would point out. I think, as a general matter, to the extent that they are not subject to some other

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exception to the hearsay rule, like ancient documents, we believe that these remaining excerpts are, on the face of them, offered for the truth of the matters asserted, because that's the only relevance that they have.

I'm not -- I guess this is one of those arguments where we would say, if you look at the thing, the relevance that it has tends to be overwhelmingly the truth of the matter as opposed to any sort of notice that it may provide.

THE COURT: Well, as I recall the context of the debate, this followed the plaintiff's presentation of material in the literature about certain scientific studies and the awareness that plaintiff contended the defendant should have had about the state of knowledge over time, and we were talking about the defendant's exhibits as counters to that, as just examples of other pieces of the literature about which the defendant was aware. So that testimony that there were other views in the scientific community and other material in the literature to rebut the plaintiff's presentation is something that the defendant legitimately could

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do.

I had the same argument from them that I have had from you, from time to time, which is to say, "We need to have the ability to show some form of corroboration of the statement that there were statements in the literature favorable to our position, not just our saying it."

And, just as you have persuaded me, that from time to time it is important to corroborate a statement about what the state of affairs were, I told the defense that while I would not allow in the articles themselves, the substance of the research, that titles and the authors for the purpose of showing that the material was being reported the way the defendant contends it was, would be admissible for that point. So I agree that Mr. Randles is making an accurate summary of how we got to where we are.

Are there particular objections to the particular exhibits that have been given to me?

MR. GAYLORD: May I ask, is 644 up for consideration at this point?

THE COURT: I have 637, 638, '83, '85, '86 and '87, so no.

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MR. GAYLORD: I think some of the objections that I am aware of are not before you yet, and I will withhold them.

I think I have two more things to say. I don't think I have specific additional objections.

I think I would like to say, presumably for each document that the defendant offers a portion of and says it is offered for notice, then presumably they acknowledge their awareness of the full contents of that document to the extent it gives them notice of anything else that we might want to offer.

THE COURT: Well, gosh, you mean you would want to now give him material that you were objecting to as hearsay, I suppose?

MR. GAYLORD: I don't think they can say, "We got this and it is notice," and then refuse to let us put something in.

THE COURT: Sure. Sure. That sounds logical.

MR. GAYLORD: Secondly --

THE COURT: I don't want to make a sweeping statement any more than you do. We will take everything up issue-by-issue.

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MR. GAYLORD: Secondly, I'm thinking maybe this is one of those times for a limiting instruction on the notice effect of things.

THE COURT: Sure, I can do that.

Mr. Cofer, you may have all of these back.

All right. Anything else before we bring in the jury? Anything else before we bring in the jury?

MR. COFER: Nothing, Your Honor.

MR. GAYLORD: No.

THE COURT: Please bring in the jury.

(Open court; jury present:)

THE COURT: All right. Jurors, we are ready. Now, we are ready. We are ready for the last session of the afternoon.

Mr. Cofer.

MR. COFER: Thank you, Your Honor.

For our next witness, Philip Morris calls Dr. Richard Carchman.

THE COURT: All right. Sir, would you step here to the witness chair and remain

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standing, please.

RICHARD CARCHMAN

was thereupon called as a witness on behalf of the Defendant and, after having been first duly sworn, was examined and testified as follows:

THE WITNESS: Yes.

THE CLERK: Please pull the mike around. State your full name and spell your last name for the record.

THE WITNESS: My name is Richard Carchman. R-I-C-H-A-R-D; C-A-R-C-H-M-A-N.

THE COURT: Thank you.

Mr. Cofer.

DIRECT EXAMINATION

BY MR. COFER:

Q. Good afternoon, Dr. Carchman.

A. Good afternoon.

Q. You recently retired from Philip Morris; is that right?

A. Yes.

Q. When and why did you retire?

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A. I retired February. The company offered an early retirement package. I was able to do that, and I did.

Q. What was your position with Philip Morris?

A. I was Vice President of Research, Development and Engineering.

Q. And how long had you been with the company?

A. Ten years.

Q. Do you still have a relationship with Philip Morris?

A. Yes.

Q. Tell the jury about that, if you would.

A. I'm providing some consulting services in three areas, this being one; product integrity. Product evaluation being the other. And general smoking and health issues being the third.

Q. Dr. Carchman, I want to review briefly your education, work experience with the jury. You have a voluminous CV, so I'm going to try to lead you through some of the points I want to emphasize, okay?

You graduated from Long Island University in 1966 with a Bachelor of Science degree in

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biology and chemistry; is that right?
A. Yes.
Q. Then while you were an undergraduate you worked as a technical research assistant at the Institute for Cancer Research at Columbia University in New York City; is that right?
A. From 1964 to '68.
Q. Tell the jury, if you would, about that work.
A. I was working full time, paying for my education, so it took me about six years to get through my undergraduate. And I worked at the institute in the laboratories of two very prominent cancer researchers studying the mechanisms of cancer and the development of drugs to treat cancer.
Q. You then received your doctorate in pharmacology from a State University of New York, Downstate Medical Center in 1972; is that right?
A. Yes.
Q. Could you please explain to the jury what the study of pharmacology involves?
A. Historically in the biomedical sciences, physiology is where most things started, from how the heart works, how the muscle works, and that

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study basically involved, you would take a scalpel and cut a nerve and watch a finger or a hand drop.

Well, that evolved into the use of drugs and chemicals to try to break the systems to understand how they worked, tear them apart, and put them back together. So pharmacology is the study of how drugs work in the body.

Q. Now, did you receive a fellowship from the National Institute of Health which assisted you in earning your doctorate degree?

A. Yes.

Q. And tell the jury about that.

A. It is a competitive program offered in the United States, and it paid me about $3,500 a year to attend school, and it paid my tuition and fees.

Q. After obtaining your doctorate from the Department of Pharmacology, you then received a second fellowship again from the National Institute of Health to perform post-doctorate research in molecular biology at the National Cancer Institute; is that right?

A. Yes.

Q. Tell the jury about that.

A. When I received my Ph.D., I had several

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job offers. Actually, I had some real job offers working at Yale University School of Medicine, or Upstate Medical Center in Syracuse. I felt I needed some additional training, so I wrote a researcher at the National Cancer Institute, a very prominent molecular biologist, I said, "Gee, can I come visit you and talk?"

I went and borrowed somebody's car and drove down to Washington and spent the day with the fellow, and he said, "Look, I'd love for you to come. I have got no money. I have got no space. You have to apply for money. If you can get money, I will find a space." And so I did that.

Q. Now, what did you do professionally? What was your first real job, as you would put it, after completing your two-year post-doc work in molecular biology?

A. I had an offer at the Medical College of Virginia as an assistant professor in the Department of Pharmacology. And it was to develop a basic research program and to do some teaching and training of graduate students, medical students.

Q. Now, you are not a medical doctor?

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A. No, I'm not.
Q. Is it common for a Ph.D. to teach medical students?
A. Yes.
Q. And what courses did you teach?
A. Over the time I was at the medical school I taught courses in pharmacology, cardiovascular pharmacology, molecular cardiology, cardiovascular toxicology, molecular toxicology. I taught antibiotics, anti-cancer, endocrine systems, and some courses in biostatistics.
Q. Now, your Ph.D. is in pharmacology, right, Doctor?
A. Yes.
Q. Are you a toxicologist?
A. Yes.
Q. And what is it that qualifies you as a toxicologist?
A. Well, I was a professor, full professor in the Department of Pharmacology and Toxicology. I'm a member of the two premier toxicology societies in the United States. I published extensively in the toxicology peer review literature, and I have been a consultant for various agencies in the federal government, as

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well as some other governments, in the areas of toxicology.

Q. What is the Massey Cancer Center?

A. At the Medical College of Virginia, they have a comprehensive cancer center. There are a few of these in the country. These are National Cancer Institute-funded centers that carry out clinical and basic research.

Q. And what's your involvement been with the Massey Cancer Center?

A. I was the associate scientific director, and my role was to facilitate bringing together basic scientists at the medical school, at the university, outside the university, and clinicians, to try to see if by working closer together some advances could be made in understanding what cancer is or was and the treatment of the disease.

Q. While you were at the Medical College of Virginia on faculty, did you maintain relationships with outside health organizations you had worked with over your career?

A. Yes.

Q. For example, did you work with the National Centers for Disease Control?

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A. Yes.
Q. The American Cancer Society?
A. Yes.
Q. The American Heart Association?
A. Yes.
Q. United States Department of Defense?
A. Yes.
Q. United States Environmental Protection Agency?
A. Yes.
Q. And did some or all of that work relate to the study of cancer and its causes?
A. Yes.
Q. Okay. Now, at some point you came to Philip Morris. If you would tell the jury the short version how you ended up going from teaching at a medical school, medical college, to working for Philip Morris.
A. Philip Morris R&D is just down the road from the medical school, and the scientists at Philip Morris would come to the medical school and take courses, go to lectures, go to seminars, get advanced degrees, get their bachelor's, their master's, apply for a doctorate. And so there was a dynamic interaction. No, unique. Some of the

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other big companies in the area did pretty much the same thing.

One of the Philip Morris scientists that came applied to the program, got accepted to the program, passed all the coursework, and then came to work in my laboratory. And after completing his basic research and submitting his research to the university, for defense, he successfully defended and published that research and he went back to Philip Morris. We became friends over that time, and we would see each other on a regular basis. And then sometime in 1988, early '88, he said, "Rich," would I consider coming to work at Philip Morris.

Q. And you said?

A. "Geez, I don't know." I was a university guy. I had one tie that went with anything that I possibly could wear. I had no idea working for a big company, working for a tobacco company, so I went and spoke to my chairman. I spoke to the dean.

I said, "Look, I would like to explore it, but I'm not sure," so I worked out -- I got a sabbatical, a leave of absence, if you will, from the school. And I took a year, said to

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Philip Morris, I said, "I'm taking this leave of absence. I'm going to see if I like you, if you guys like me." If not, I was going back to the university. That was fine with the dean and the chairman.

Q. What did you do during your sabbatical year while you were on loan to Philip Morris?

A. I had a series of assignments given to me by the number one and two scientists in the research and development.

Q. Who where they?

A. The head of R&D at the time was Dr. Kent Houghton, and the vice president of research was Dr. Jim Charles, who was the fellow who got his degree with me.

Q. He was the friend who recruited you?

A. Yes.

Q. Did you finally or ultimately make a decision to go to work at Philip Morris?

A. When that year was up, I made a decision to stay at Philip Morris R&D.

Q. Now, while you worked at Philip Morris -- once you got there, did you maintain your contacts with some of these outside research organizations that we talked about?

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A. Yes.
Q. Did you continue your work of studying cancer and the causes of cancer after you went to work at Philip Morris?
A. Yes.
Q. Would you please tell the jury briefly the various job positions that you held at Philip Morris and the job responsibilities that went with those positions.
A. I came in as a technical person, and it was wonderful. I had nobody reporting to me, but I had the vice president behind me. When they saw me, they saw the vice president, so they paid attention to what I asked for.
And I had a number of assignments. One had to do with ingredients. Ingredient testing. Biological testing over all INBIFO. Actually, I was given the responsibility of getting a totally thorough understanding of our institute and of actually being the gatekeeper, if you will, between the institute in Germany and the R&D folks in Richmond.
Q. That institute is INBIFO. The jury has heard about INBIFO. That's what you're talking about?

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A. Yes. I was given one more assignment by Dr. Charles. That was to review a program at Philip Morris called the Nicotine Analog Program.

Q. Now, while you were with Philip Morris, did you serve on any government boards or committees concerning smoking and health?

A. Yes.

Q. What kind of people were part of those committees?

A. I served at the request of the Canadian Department of Health with public health officials both from Canada, but were predominantly full of public health scientists and physicians from the United States.

Q. And let me try a couple of names that the jury has heard, or some of them. This Dr. Neal Benowitz. Did you work with Dr. Benowitz on that committee?

A. Yes.

Q. How about Deitrich Hoffman?

A. Yes.

Q. Dr. Hoffman is associated with Ernst Wynder at the American Health Foundation?

A. Yes.

Q. When were you asked to serve on that

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committee?
A. Last year I was still serving on that committee, and they are going to be publishing the results of our meeting within a month or two.
Q. Now, you talked about what your tasks were when you first came to Philip Morris. You mentioned being the gatekeeper for INBIFO, you mentioned reviewing the Nicotine Analog Program. Was one of your duties also to learn the history of Philip Morris' R&D?
A. Yes.
Q. And why was that?
A. Well, my, I would say, overriding responsibility with regard to INBIFO and product testing had to do with this concept that had been in various stages of implementation for many decades in the Philip Morris R&D regarding the development of hopefully safer products.
Q. And as part of your responsibilities, did you work on trying to develop a safer cigarette?
A. Yes.
Q. Dr. Farone testified and he told the jury that there was an assumption among the scientists in R&D that cigarette smoking caused lung cancer and other diseases.

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I want to ask you, did the scientists who worked on making a safer product have that assumption --

A. Yes.

Q. -- as the basis of their work?

A. Absolutely.

Q. Tell the jury, why is that important? Why would you do that?

A. If you are going to have a serious endeavor to do something, you have to operate -- it is an operational perspective that, indeed, what you are doing is the right thing, the right thing to do. You can't go into this in a half-hearted way.

Q. Dr. Carchman, I want to talk with you about cancer and cigarette smoking, and I just want to ask you straight out, does cigarette smoking cause lung cancer?

A. Yes. With an explanation.

Q. And what's that explanation?

A. If by "causes lung cancer" you equate cause with increased risk, then it does. And that's how I would say the general public would view it, and that's how much of the public health community views it, equating cause with increased

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risk.
Q. What other definition is there?
A. Well, the explanation piece has to do with some aspect, and it is a very important aspect for us in terms of developing -- trying to develop safer products, it has to do with the scientific understanding of the cause.
Q. Well, let me ask you first, is this a new position espoused by Philip Morris?
A. No.
Q. Has Philip Morris ever told the public that smoking causes lung cancer?
A. Philip Morris, that I'm aware of, has said for quite a period of time that smoking is a risk factor, lung cancer and other diseases.
Q. Now, you mentioned the word "mechanism." Is that another way -- is that a scientific way of saying -- trying to figure out how cigarette smoking causes cancer?
A. That's one of the things that really is the pillar of the scientific aspect of this question.
Q. Well, why is it important that the mechanism be discovered?
A. Well, there are at least two reasons, and

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I think one has to do with if somebody claims an injury, say, relating to smoking, knowing not just the mechanism but also what constituent or constituents in smoke are responsible, are absolutely essential in terms of scientific proof.

In addition, if you're trying to develop a safer product, knowing what the constituent or constituents is and knowing how that works becomes critically important. Otherwise, you're sort of like the blind man in the room with the elephant, sort of feeling around trying to figure out what it is in the room. Sometimes it feels like a snake, sometimes it feels like a horse, but it is neither of the two, and that is sort of the situation we are in now.

The third reason is you don't know what to compare the cigarette to. What is the right cigarette to compare those to to know that you have improved the product? If you don't know what the constituent or constituents, and you don't know what the mechanism is, you are still operating in a sort of blinded fashion.

Q. Let me ask you this: As of today, March 15, 1999, does science know what constituent in cigarette smoke causes cancer?

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A. No.
Q. As you sit here today, do you know any reputable scientist anywhere in the world who claims to know what constituent in smoke causes lung cancer?
A. I'm not aware of such a scientist.
Q. As you sit here today, do you know any reputable scientist anywhere in the world who claims to know the mechanism by which smoke causes lung cancer?
A. No, I don't.
Q. Has the Surgeon General, in all the reports issued to the American public, ever identified a specific constituent or the mechanism by which smoking causes lung cancer?
A. No.
Q. Now, over the years has Philip Morris taken the position that the scientific community should continue to look for the mechanism and the constituent in smoke that causes lung cancer?
A. Yes.
Q. And why is Philip Morris insistent on that?
A. Well, I think the answer to that question goes back to the scientific dilemma we are in now.

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In the absence of having a better understanding of what constituent or constituents might be important here and the mechanism, we are not going to be able to advance the ball in terms of trying to develop or being able to develop a safer product.

Q. That's what I want to talk with you next. What has Philip Morris done to address the health claims about cigarettes, and have you prepared a chart that will illustrate that for the jury?

A. Yes.

Q. Come on down and we will get the chart and talk about it.

This one, the Elmo, why don't you go down by the TV, if you would, Dr. Carchman. You might want to stand on the other side of monitor; otherwise, you will block the jury.

This lists four things: General reduction of tar, selective reduction of specific components, development of the denicotine cigarette, and development of nonconventional cigarettes.

The jury has heard about a number of these. Let's start with selective reduction. What does "selective reduction" mean?

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A. When you look at tobacco smoke, it is really a complex aerosol. The simplest way to describe it, it has two parts. It has a part that is gases and a portion that is found in the particles; the part that you would call condensate or tar.

So you would have things that are in one, the other, or both. And some of these things that the public health community and scientists have identified as being things we want to get rid of are found in one or both of these places. And so the question from a selective reduction perspective is, can you do something to reach in and pull one thing out, or one kind of thing out? That's the selective piece of this.

Q. Now, the jury has heard overall tar reduction, but you're talking about identifying a specific thing and just trying to remove it; is that right?

A. Yes.

Q. Let me ask you this: Over the years, has it been somewhat of a moving target what the selective thing is, what it is that the company should focus on?

A. That's the nature of science. You know,

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it starts out being the hottest thing one day; the next day nobody cares about it or it is not important. So it is the fundamental nature of scientific investigation. It has been a moving target.

Q. Now, on the chart is benzoapyrene. The jury has heard about benzoapyrene. Is that an example of something found in smoke that the public health community identified as a potential cause of lung cancer?

A. It was one of the first components that was felt to be the reason, the most potent carcinogen smoke responsible for lung cancer. That material, which is produced whenever you burn organic matter -- if you grill a steak, or hot dog, you throw the coal or lava on the fire, you drive your car, you're going to generate benzoapyrene.

Q. Is there a way to selectively remove benzoapyrene from tobacco smoke?

A. Not today.

Q. Efforts made to do that?

A. Absolutely.

Q. Can you tell the jury about some of it?

A. Well, part of it has to do with either

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trying to find out what the source of the benzoapyrene is. Unfortunately, it is the tobacco, or it is anything that is organic that is being burned. You can try some selective filters, but none of them are selective. Or if they appear to be selective in the laboratory, don't work in the cigarette.

Q. Now, you mentioned that early on the public health community thought benzoapyrene was the culprit, right?

A. Yes, sir.

Q. Did there come a time when the public health community changed its mind?

A. On benzoapyrene they have gone back and forth over about 45 years from it being the most potent carcinogen to not being important. And today, 1999, benzoapyrene is listed as an animal carcinogen. It is not listed as a human carcinogen. But it has had its ups and downs in the last 45 years.

Q. I put on the Elmo a British Medical Journal Association, January 5th, 1957, by Ernst Wynder, towards a solution of a tobacco cancer problem. What did Dr. Wynder conclude in 1957 about the significance of benzoapyrene to

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cigarettes and lung cancer?
A. I mean, it is sort of in this period of time that there was great excitement about benzoapyrene being very important in the role of lung cancer and smoking.
Q. And what did Dr. Wynder say? Did he say that's what was causing it?
A. Yes. And this goes right along with -- bless you -- with the notion of tar. Benzoapyrene is found in the tar. And Dr. Wynder, since 1950, has been saying that tar is the reason, and we need to reduce -- if people are going to continue to smoke, then we have to reduce the tar.
Q. Now, I don't think I'm permitted to show the specific quote to the jury, but did Dr. Wynder conclude in the article that it was not benzoapyrene?
A. Right, that it was not sufficient.
Q. Because of the amount?
A. Well, there is actually an infinitesimally small -- small amount. If you have an idea what a gram is, this is one-billionth of a gram. It is an absolutely miniscule amount that is found in the cigarette.
In fact, a few years ago, the United

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States Environmental Protection Agency funded a study to look at benzoapyrene in the United States, and what they concluded was that 98 percent of the benzoapyrene that a two-pack-a-day smoker took in, that person got from eating, drinking, and breathing. Not 2 percent came from two packs; 98 percent came from walking around normally.

Q. Similarly, in the 1964 Surgeon General's Report did the Surgeon General conclude that the inability to account for the carcinogenicity of tobacco product, except to a very minor degree, by the amount of benzoapyrene present was unanticipated?

A. Yes. That was reiterated recently in a USCPA risk assessment on diesel engine exhaust where they made the same conclusion, as well. That was in this decade.

Q. Next selective reduction topic, phenols. Tell the jury, what are phenols?

A. They are very simple. Ring structure found in tobacco smoke. But like almost everything else, it is found in other places as well.

Q. Did Philip Morris ever modify its filters

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to selectively reduce phenols?
A. The answer is yes, and the reason is, again, the public health community had tagged phenols as carcinogenic, then they tagged them as anti-carcinogenic, and then they tagged them as what are called tumor promoters.
So, again, as science and the understanding of what was going on changed, their targeting changed as well. Nevertheless, we modified our filters to try and reduce the amount of phenol in tobacco smoke.
Q. Let me show you an example of that change. Are you familiar with -- and this is Defendant's Exhibit 637.
Can you read that there? "Cigarette smoke carcinogenesis important tumor promotors by L. Van Duran."
A. Benjamin Van Duran.
Q. And Dr. Van Duran, in fact, reports that he found that phenol, which is a weak tumor promoting agent, is, indeed, an inhibitor of tumor genesis when applied simultaneously with benzoapyrene?
A. That's right.
Q. Tell the jury what that means.

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A. If you take benzoapyrene at a high enough level in the right animal, you will get cancer. So the right dose, the right route of exposure, the right animal, you get cancer.

You take phenols, in this situation, you don't get any cancer. But if you take the phenols and the benzoapyrene at the same time, you don't get cancer. So it seemed, the ability of phenols to interfere with the carcinogenicity of benzoapyrene.

Q. You have a carcinogen, a carcinogen, put them together, no carcinogen?

A. No tumor.

Q. Let's talk next about nitrosamines. The jury has heard about nitrosamines. Volatile nitrosamines. Have they been suspected of causing lung cancer?

A. Early on they were felt by the public health community of playing a causative role in smoking-related lung cancer.

Q. In fact, in 1981 did the Surgeon General of the United States in his report, "The Health Consequences of Smoking, the Changing Cigarette," report that?

A. They no longer felt that volatile

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nitrosamines were that important in this process.
Q. In fact, this is in evidence. Let me read it to you. Tell me if I am reading it correctly. "At present, there is no reason to assume that volatile nitrosamines cause lung cancer in smokers," right?
A. Yes.
Q. So they thought it did, thought it didn't; is that right?
A. Yes.
Q. Is Philip Morris still working to take nitrosamines out of cigarette smoke?
A. Yes.
Q. While we're on nitrosamines, there has been some discussion of it. Are nitrosamines an animal carcinogen or a human carcinogen?
A. The nitrosamines, since we just had the '81 Surgeon General remove volatile nitrosamines, the only nitrosamines left are these tobacco-specific nitrosamines. We call them TSNAs, and there are almost a dozen different kinds found in tobacco and tobacco smoke.
Of the three that are carcinogenic, they are only carcinogenic in certain animals under certain conditions. There are no tobacco-specific

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nitrosamines that are considered by authoritative bodies, scientific bodies, to be human carcinogens. Three of the nine or ten are listed only as animal carcinogens.

Q. Okay. Let's keep track. We have talked benzoapyrene. We have talked phenols. We have talked nitrosamines. Let's now go to Plutonium 210.

I want you to assume that Dr. Farone told the jury that Plutonium 210 is a heavy metal. And that's a problem for cigarette smoke. What is the current thinking in the scientific community about the health effects of Plutonium 210?

A. I have to go back to '64, '65, when the first papers came out in Bradford & Hunt where they suggested that Plutonium 210, a low-level radioactive material, is found everywhere. It is in this room. It's in tobacco. It's going to be in tobacco smoke. If you going to smoke that cigarette, that Plutonium 210 is going to be deposited in your body. It is going to give off radioactive energy. That energy has the potential for damaging cells and then causing cancer. That was the thinking in '64, '65.

In 1980 at the Bandbury Conference at

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Cold Spring Harbor on the other coast, two scientists from NYU published a study. I think the title of the study was "Plutonium 210: A Questionable Risk Factor," and basically they concluded very much what the Surgeon General said about volatile nitrosamines, they concluded the same thing about Plutonium 210.

In fact, the next year, in the '81 Surgeon General's Report that was up prior to this, the Surgeon General adopted basically the same notion, that Plutonium 210 is a questionable risk factor.

Now, that's 1981. This is 1999. There are a number of government and state public health bodies around the world that are asking for and getting smoke constituents from smoking a cigarette. Not one of those bodies will appear in the United States, or overseas, has asked for any measurements of Plutonium 210. So I would say since 1981 nobody takes, in a serious public health perspective, the presence of Plutonium 210 being an important factor.

Q. Now, later in your testimony I will show you a chart that Dr. Farone prepared where he identified target compounds in smoke that he

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believes should be removed. Take my word for it, one thing he talked about was carbon monoxide. He talked about a cobalt filter.

I want you to assume that Dr. Farone told the jury that Philip Morris killed the project involving a cobalt filter, even though it was successful in significantly reducing carbon monoxide.

What I want to ask you, is there more to the cobalt filter story? And if so, tell the jury the rest of the story.

A. When you think about a cobalt filter, don't think about the chunk of cobalt in a filter. There is -- I don't know -- 0.1 percent cobalt salt. In the laboratory, it worked great. You put the little filter there, blow carbon monoxide through it, and it disappeared.

You put that into a cigarette, and what you find out is that the moisture in the air poisons the filter. When you smoke the cigarette, the water in the tobacco comes through and poisons the cobalt filter. So it works in the laboratory in which you have controlled everything. It doesn't work in the real world.

Q. Okay. Let me go to Plaintiff's Exhibit

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48. This is a document from Wakeham and Cullman, Technical Forecast. Are you familiar with this document?

A. Yes.

Q. In it, Dr. Wakeham talks about chemical carcinogenesis, irritation by smoke components. Polynuclear hydrocarbons, co-carcinogens, nitrosamines, carbonates or urethane, terpenes, other chemicals, all compounds.

Do you agree those are all compounds in 1963 that were implicated or suspected of causing lung cancer in cigarette smoke?

A. Yes.

Q. Has Philip Morris investigated those compounds?

A. Those and others.

Q. And, in fact, is this an example of the moving target on selective reduction?

A. Yes.

Q. Bottom line, does selective reduction work, at least to date?

A. Not at this time.

Q. Is Philip Morris still pursuing selective reduction?

A. Yes. We have scientists in R&D that have

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continued to try to figure out a way to selectively remove smoke components.

Q. Okay. General reduction. We have talked about this a great deal in this case with both Neal Benowitz and with Bill Farone.

Just put everybody on the same page. Tell the jury again the concept of general reduction.

A. First of all, this really gets to not putting all your eggs into one basket. So if you can't get rid of any one particular one, maybe you can get rid of a lot of them at the same time. That's what it really is. It is trying to throw out a big enough net to try to capture as many things that have been identified as things they would like to see -- we would like to see out or removed.

Q. Again, the jury has heard about this, but has Philip Morris implemented product innovations to generally reduce the amount of tar and nicotine in cigarettes?

A. Yes.

Q. Are these examples?

A. Only illustrative. Only examples.

Q. For example, 1954, filters introduced?

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A. Yes.
Q. 1957, reconstituted tobacco?
A. Yes.
Q. And that's what Mr. Burnley told us about today?
A. I believe so.
Q. Told about the BL method and RL method used later.
Were there earlier efforts on reconstituted tobacco?
A. Yes.
Q. '59, ventilation?
A. Yes.
Q. Permeable paper?
A. Actually, if I could, Mr. Cofer, when you asked me about the cobalt filter, in terms of removing CO, I told you it worked in the lab, it didn't work in the real world.
Well, the use of permeable paper basically lowers carbon monoxide emissions. Those blue arrows coming up, that's carbon monoxide. So one way of removing or reducing carbon monoxide was the introduction of permeable paper. So one approach didn't work. We had a couple of other ones that were possibilities. This one worked and

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it was commercializable.
Q. Expanded tobacco. Tell the jury about that.
A. This is sort of nifty in the sense that if this is tobacco from a cigarette, what they do is they take this tobacco and they puff it up. Instead of looking like this, it is like this. It is like puffed wheat, puffed rice.
The value of this is you end up using less tobacco. The tobacco is the component of the cigarette that has the biological activity, and so over time one of the things that has happened, and another recommendation from the public health scientists was put as little tobacco in the cigarette as you can, and the expansion process and creation of expanded tobacco allow for the reduction in the amount of tobacco used in the cigarette.
Q. And then finally reduce circumference. Are there some cigarettes that are thinner than others?
A. Yes. Again, it is the less tobacco you burn, the less biological activity you are going to get.
Q. Two bottom lines here: One, does

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Philip Morris use this technology today in its products?

A. And others, as well. Yes.

Q. And over the years has the public health community said that general reduction is the way to go?

A. Yes.

Q. Ernst Wynder. What did he have to say about it?

A. Well, he really started the ball rolling in the United States when he published his first series of epidemiological studies. And he concluded, as I said earlier, that if you can get a cigarette that delivers less tar, you should have a reduction in risk. He was focusing on lung cancer, but he wasn't necessarily limiting his comments to lung cancer.

Q. How about the Tobacco Working Group?

A. The Tobacco Working Group, or the TWG, was a National Cancer Institute-sponsored cooperative effort between the National Cancer Institute, United States scientists, institute scientists, and some tobacco company scientists. It went on for a significant period of time investigating these kinds of cigarette design

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changes, if you will, and others.
Q. And while we are talking about that, what did the Tobacco Working Group recommend?
A. For instance, they recommended using reconstituted tobacco. They recommended using less tobacco. That's where the expanded tobacco comes in. They recommended actually in the process, if you ventilate cigarettes to reduce the tar delivery. There was even conversations about adding flavors to the cigarettes, to making the cigarettes more acceptable to the consumer because the feeling was, and Dr. Wynder was one of the vocal individuals here, if you come up with a safer product and nobody used it, that's -- if people are going to continue to smoke -- he didn't want people to smoke, but if they were going to continue, he said, "Make a safer product." If you can't make the safest product, make a safer product.
Q. Let me ask you about that, since you brought that up.
Did Wynder basically express the view that if you made really a pretty safe product but only 1 percent of the market used it, it would be better off making a marginally less safe product

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if a lot of smokers used it?
A. That comes out of the chapter in the Bandbury Report from 1980. Those are pretty much his words.
Q. Others that have thought general reduction is the way to go, the Surgeon General. Any one report?
A. Actually, in '67, even before that, Dr. Wynder and Dr. Hammond. Wynder, at that point, was probably still at Sloan Ketterling in New York. Dr. Hammond, at that time, was one of the principals at the American Cancer Society, and they set in motion a series of recommendations to the Public Health Service, to the Surgeon General, basically saying the data strongly suggests that -- I'm paraphrasing here, forgive me -- that there is a reduction in risk with lower tar. That was '67. Okay.
Now, in 1980, the year before the Surgeon General's Report in the Bandbury document, Dr. Hammond reflects back in his chapter about this, and what he says in '80 and is carried over in the Surgeon General's Report in '81. He says, "I want to change that," is what he says. What he says in 1980 in the Bandbury Report is, "I want to

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take it from the date of 'strongly suggests' to the date of 'very strongly suggests.'" He was talking about lung cancer at that point.

Q. Okay. Now, we're talking about, though, back in time. I want to bring the jury up though closer to the future, 1988, 1989, new case studies?

A. In the UK, their Department of Health in '88, Dr. Froggart makes a strong recommendation, "Let's push the government to enact legislation to push the industry to further lower the tar delivery." That's '88.

Q. That's the government of the United Kingdom in 1988 making those recommendations?

A. That's correct. In 1996, in the -- actually, what's called the Federal Trade Commission Monograph No. 7, sponsored by the National Cancer Institute, in their review -- this is 1996 -- they reflect back to 1981, and what they say in 1996, "What was true in 1981 is still true in 1996 about low tar and risk reduction." 1988, three reports were filed. One updated report in the United Kingdom.

Q. '88?

A. '98.

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Q. '98, last year?
A. Yes, last year.
Q. Okay.
A. And from the Department of Health in the UK and the Department of Health in New Zealand, basically saying, "Let's push the industry, let's get the tar levels down some more." And Dr. Richard Peto, one of the most prominent tobacco control scientists, epidemiologists in the world in the journal, Regulation, basically said, "We need to get American blended low tar delivery products into the world market as quickly as possible." He wasn't talking about western Europe, he wasn't talking about the United States, he was talking about the rest of the world.
Q. Let's be clear so there is no confusion here.
These public health authorities weren't telling people, "You ought to smoke cigarettes," what they were saying, "If you are going to smoke a cigarette, smoke a reduced delivery cigarette," is that fair?
A. That's what they have said, and that's what they are still saying in parts of the world.
Q. Now, you mentioned the Tobacco Working

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Group and you described it generally. Is this one of the reports from the Tobacco Working Group?

A. One of many, yes.

Q. Now, at the top it says, "National Cancer Institute Smoking Health Program," right?

A. Yes.

Q. "Report No. 5, toward less hazardous cigarettes"; is that correct?

A. Yes.

Q. This is Defendant's Exhibit 686. "U.S. Department of Health, Education and Welfare, Public Health Service, National Institute of Health."

Did I read that right?

A. Yes.

Q. Is that the Surgeon General's Office?

A. Well, the Surgeon General's Office is located within that organization.

Q. Now, you talked briefly, or just generally about who was on it. Let me turn to the next page. It has an acknowledgement.

You will have to tell me over there whether this is legible, or maybe I will hand you a copy.

Basically, I just want to briefly talk

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with the jury about who the people were that were working on this NCI Tobacco Working Group. I have highlighted a couple of names.

Bob Seligman, who does he work for?

A. He worked for Philip Morris in research and development.

Q. Helmut Wakeham, who did he work for?

A. He also worked for Philip Morris in research and development. Both of those gentlemen were heads of R&D at different periods of time.

Q. How about Ernest Wynder, is that Wynder of Wynder, Graham?

A. That's the Professor Wynder from the Wynder, Graham JAMA paper.

Q. Jesse Steinfeld, Surgeon General of the United States?

A. Yes.

Q. Who is Paul Cotent (phonetic)?

A. I think at this time -- I don't know if he was at the National Institute of Health or not, I believe, at the time.

Q. How about Deitrick Hoffman?

A. Deitrick Hoffman, a long-time colleague of Ernest Wynder at the American Health Foundation.

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Q. So is it fair to say that this Tobacco Working Group consisted of prominent researchers in the area of smoking and health, both inside and outside tobacco companies?

A. Yes. As I said, both government, university, and institute people, as well as some industry scientists.

Q. Does Philip Morris continue today to work with members of the public health community in an effort to make safer cigarettes?

A. Yes.

Q. Do you currently attend meetings at the various associations you belong to?

A. Yes.

Q. Do you attend scientific seminars?

A. Yes.

Q. Were you asked to speak at outside scientific symposia while you were employed by Philip Morris?

A. Yes.

Q. Did you interact with scientists from other branches of science, not tobacco company scientists but public health scientists, independent scientists?

A. Yes.

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Q. I think you mentioned Dr. Benowitz. What has your work been with Dr. Benowitz?

A. Under the auspices of the Canadian Department of Health, Dr. Benowitz, myself, and a number of other scientists are working with the Canadian Department of Health to develop a potentially less hazardous cigarette. And I went up there and made a series of presentations in terms of how Philip Morris tests its products, and we sat around, and we argued with each other, not just about what I was doing, but what everybody was doing, how we can do things better, how we can do things differently.

At the end of the day, we submitted all of our documents, including the criticisms, and that's going to be published this year. And there was a very strong indication that these efforts will continue, and my involvement and the involvement of Philip Morris will be encouraged.

Q. Does Philip Morris encourage its scientists to interact and attend these symposia and attend seminars and participate in this project?

A. Yes.

Q. Does Philip Morris invite independent

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scientists to come to Philip Morris to lecture and give talks and presentations about these issues?

A. All the time.

Q. Bandbury Report. You referred to that. Could you just tell the jury a little bit about that? I will see if I can find it.

A. The Bandbury Report, which was published in 1980, reflecting a meeting that they had in 1979 in Cold Spring Harbor, which is a really lovely place on the east coast. I think Jim Watson was the head of it. He won the Nobel Prize with Crick for discovering the helical structure of DNA. It was an opportunity to bring together a large group of scientists, both physicians, basic scientists, psychologists, to handle a very important question.

You also had people like Dr. Geogory (phonetic) from the National Cancer Institute, who was the head administrative scientist of the TWG, the Tobacco Working Group, for the national cancer group. So you had people like Geogory, you had Ernest Wynder there. I think we went through some of the list.

Q. I think the two conclusions that you told the jury were they supported lowering tar and

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nicotine levels. Thought that made a difference; is that right?

A. And they worked on developing components that they thought would help move this lower tar delivery product in the right direction.

Q. Did Dr. Hoffman, Deitrick Hoffman, express any views about how the tobacco companies responded to scientific developments and whether they used those in their products?

A. I think in a number of places publicly he acknowledged both the support the industry had put in and how important this was. And, in fact, in Canada the discussion -- this discussion came up about the continued involvement of the tobacco companies, at least some of the scientists from the tobacco companies in this effort, and the feeling, as expressed by the public health people there, was that the Canadian government could not move forward without the knowledge that the tobacco companies had in this area. That the experts in doing this, part of them resided within the scientists in the tobacco companies.

Q. Let me take this from you, because we are going to change topics. Stay down here, if you would, please. Okay.

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You have four things on your original chart. Philip Morris' efforts directed at smoke issues. We talked about selective reduction. Anything else you want to say about that?

A. No.

Q. We talked about general reduction. Anything else you want to say about that?

A. No.

Q. Let's go to a couple of things that are unique to Philip Morris. And first is development of a denicotine cigarette, such as Next, okay? Do you have a time line that talks about the development of denicotinized cigarettes?

A. Yes.

Q. Let me put this on and I will ask you some questions.

What I did is I put a little Post-It note here that tells when Philip Morris acquires a coffee company, and we don't need to get into the specifics of that, but I think that will be pertinent in terms of some of the discussion regarding some of the techniques.

Let me just have you explain what that is. First of all, what is a denicotinized cigarette?

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A. It is a cigarette, looks like any other cigarette. It's tobacco, wrapped in paper with a filter, but that tobacco has had the nicotine removed from it.

Q. And when did Philip Morris first market a denicotinized cigarette?

A. The marketing of these products occurred, I think, around 1989, 1990.

Q. Tell the jury, Dr. Carchman, why was Philip Morris interested in introducing to the market a cigarette that didn't have any nicotine in it?

A. Again, this sort of comes from some concerns expressed by the public health community about the role of nicotine and smoking. And their major concern was cardiovascular, the heart and the circulatory system.

So there has been at various times -- this is, again, the moving target issue. At various times it was felt that nicotine was important in terms of cardiovascular disease. That's no longer, 1999, felt to be that important. So one of the things that they talked about was lowering nicotine.

Now, at various times they also talked

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about raising the nicotine for another issue. But in this case, they are talking about lowering the nicotine, and because they talked about it, it was also some consumer interest. If the public health community said this is a good thing to do, we would like to try a cigarette that had little or no nicotine in it.

Q. And I'm going to ask you to walk the jury through the time line, but first I note it starts in 1985.

Let me ask you this: Before this work on the Next cigarette, did Philip Morris make efforts to try to take the nicotine out of tobacco?

A. They have about 35 years' worth of research and development attempts. You can take it out. You can take it in the laboratory, put it in solvents, extract the nicotine, and a bunch of other things.

Q. I want to stop you right there, because Dr. Farone told the jury that you can't take the nicotine out, and Philip Morris had the ability to take the nicotine out of cigarettes a long time ago. Is that true?

A. Absolutely.

Q. Well, then why did it take you so long?

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A. Well, you didn't end up with tobacco. You ended up with something that looked like chocolate pudding that you couldn't put in a cigarette. If you could get it into a cigarette, you couldn't smoke it. And if you could get it into a cigarette and you couldn't smoke it, nobody wanted to smoke it.

So, again, it is a long series of efforts being able to do things in the laboratory and then implemented at various stages.

Q. Why don't -- this may be a good time to pick up with the development of Next. Why don't you start with November of 1985 and just walk the jury through the time line.

A. We were not unique at all in trying to remove something from a consumer product. We ended up buying a coffee company in 1985. This coffee company was trying to take caffeine out of coffee. All of the things we had tried on nicotine and tobacco, they had tried on coffee.

Just like it worked in tobacco, it worked in coffee. They came up with a method for removing caffeine that used a solvent called methylene chloride, and it worked really well, but for PR reasons, it became unacceptable to continue

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doing it.
Q. Hang on. "PR," what do you mean?
A. Public relations. Methylene chloride is a halogenated -- it has chlorines on it. It is a small little molecule.
Q. This happened before or after Philip Morris acquired it?
A. Before.
Q. Okay.
A. And they had to develop a new process that didn't have the negative baggage that methylene chloride did. Methylene chloride, the way it was used in decaffeination was not a toxicology issue, it was not a safety issue. In fact, the residual methylene chloride that was left in the coffee was less than the methylene chloride that was in the water when you opened your tap to make it. There was more methylene chloride in the water than the coffee.
Q. I want to stop you right there. You are telling me the methylene chloride was not a health issue?
A. No.
Q. Was not a toxicological issue?
A. Not in this context.

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Q. In the coffee, was it effective in taking the caffeine out of coffee?
A. Yes.
Q. You get more methylene chloride in the water you use to make the coffee than the process?
A. Yes.
Q. So why was it a problem?
A. It was a public relations problem. People didn't want to have to say that it was some residual methylene chloride, and they had some competitors that were using a water extraction method, so it was a competitive disadvantage as well to use this particular approach.
Q. Okay. Go on.
A. So as a result of this problem that they found themselves in, they developed a new technique, what's called supercritical extraction. What they do --
Q. I think we have a chart.
A. -- is they take carbon dioxide, carbon dioxide in the air. They put it under a lot of pressure. It goes from being a gas to being a liquid.
When we talked about the expanded tobacco, that's using carbon dioxide as well. But

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it is using carbon dioxide in a different form.

Carbon dioxide is a liquid, behaves as a solvent. You can pull lots of things out so the system -- though this talks about tobacco, this is the way it works for coffee, as well. There is a pressurized system. So this is a closed system. A lot of pressure.

The carbon dioxide is a liquid. This is the tobacco. The tobacco that is in the end of a cigarette. The carbon dioxide comes from this bed of tobacco, pulls out the nicotine and some other things. It takes, under these conditions, about 97 percent of nicotine.

So you have got carbon dioxide, nicotine, and a bunch of other things. This stuff then goes here, and they scrub the carbon dioxide of the nicotine by absorbing it onto tobacco stems.

Q. Let me stop you for a minute. I jumped ahead in the process.

Tell the jury what the effort were, what the process was. You get a coffee company, and they can take caffeine out. How did you translate that process to tobacco?

A. That took about a year and a half, and what happened was we sent our top scientists from

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Richmond to Bremen, Germany, where this facility was located. They spent 18 months living on the pilot facility on cots trying to develop this coffee system for tobacco.

And that I think is sort of depicted here on this, on this time line -- thank you. And this is -- that's the blowup of this process here. So it took them about a year and a half to get enough confidence that said, by golly, we can take tobacco, put it in and get rid of 97 percent of the nicotine, plus some other things.

So we bought this company in '85. We sent our top scientists over there for a year and a half. You come back now within August of -- would you sharpen it -- that's great.

-- August of '87. The pilot facility opens, and then very quickly thereafter they begin construction of the commercial plant.

Q. Let's stop right there. What is a pilot plant?

A. When you are doing something in the laboratory and you want to implement it up, what the engineers will tell you is that, let's do this in steps, because what works in the laboratory of a small scale doesn't necessarily work the way you

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want in moving up to a manufacturing-type scale.

So people like Harold Burnley and his colleagues are intimately involved in this whole process of moving what turns out, an initial concept, into some sort of commercializable process. And this factory, and it is hard to see here, is this very large structure here. And that took, I think, less than two years to build, which is remarkably quick for the kind of things that were going on.

The plant that was built to extract the tobacco is to the right of it. What you ended up with when this thing was working, you had a facility that could take 20 million pounds of tobacco a year, 20 million pounds, extract the nicotine and some other things, bring that over to this manufacturing facility, and this manufacturing facility can make a couple of billion of these denicotinized cigarettes a year.

So from a little study in Bremen, Germany and their pilot plant to within a few years of having a full-blown commercial operation up and running dealing with 20 million pounds of tobacco and making several billion cigarettes, in my opinion, is quite a remarkable task in terms of

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how quickly it came together.
Q. From a pilot plant to a full-blown commercial plant, right?
A. Yes.
Q. Then what products resulted from all those efforts? What products actually went to market?
A. There were three brands that were put out and test marketed in the United States. One, you have shown, Mr. Cofer, Next. There was a Benson & Hedges brand. And there was a Merit-family brand. There were three, at least three brands of this product that were put out on test market in the United States.
Q. Do you know how much money was spent on this project, all and all?
A. $300 million.
Q. So you took -- so you described the efforts. You came out with three brands. Did you bring them to market? Did you actually put them on the shelves for people to buy them?
A. They were put in test markets in six cities in the United States for some period of time.
Q. What happened?

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A. Well, there was initial consumer excitement. They liked this idea, it was out there, but then very quickly people started complaining it left a bad taste in their mouth. Sort of a comparison is drinking pop without the fizz in it. It was flat.

Q. Did they try to sell them?

A. Actually, they spent a lot of sleepless nights in R&D, the flavorists, in trying to figure out how they could modify this product to make it more consumer acceptable.

Q. Were you involved in testing those flavors?

A. Yeah. That was one of my responsibilities, was to make sure that whatever modification they were trying was not going to create another kind of problem.

Q. So was this ultimately taken off the market?

A. Yes.

Q. What happened to this big, old plant?

A. It's still there.

Q. You have a big, old plant empty just sitting on the campus?

A. Yeah. We have an empty facility for

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doing the extraction as well.
Q. I'm going to ask you to give some opinions throughout your testimony. I will try to preface them with the proper language.
First, I want you to agree that any opinion, that I ask you to give, that you will state to a reasonable degree of scientific probability. Okay?
A. Okay.
Q. All right. Now, let me ask you this: If Bill Farone, Dr. Farone, told the jury that Next was a safer cigarette, that it had no --
THE COURT: Excuse me. The form of your question concerns me. I'm going to alert you ahead of time so you can rephrase.
Dr. Farone has testified. We need to be careful not to ask other testifying witnesses questions that could be interpreted for the witness to comment on the credibility. Don't phrase it in terms of what Dr. Farone said. Just ask your question.
BY MR. COFER:
Q. Let me ask you this: Was Next or any of the style of cigarettes Philip Morris introduced that were denicotinized, was that a safer

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cigarette that had virtually no tobacco-specific nitrosamines?

A. I will answer the second part of your question first. And the answer is that these cigarettes, these denicotinized cigarettes had tobacco-specific nitrosamines in the tobacco and they had it in the smoke.

Q. Okay.

A. The first part of your question, is it a safer product? I don't know.

Q. Anything else we need to talk about with respect to Next or denicotinized cigarettes?

A. Not at this time.

Q. Okay. Dr. Carchman, the fourth area that you have on your chart of Philip Morris R&D projects is another one the jury has heard something about. That's development of nonconventional cigarettes, the Accord. I want to turn to that next.

First, let me ask you this: How does Philip Morris define a conventional cigarette?

A. Conventional cigarette is tobacco, wrapped in paper, that you burn.

Q. Now, how does Philip Morris define a nonconventional cigarette?

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A. Tobacco, wrapped in paper, that you don't burn.

Q. Why is it you wouldn't want to burn the tobacco?

A. To answer that question, I have to reflect back almost 40 years to a concept developed by Dr. Helmut Wakeham, then head of Philip Morris R&D. In laying out what I believe was a template for what has continued to go on in R&D almost 40 years later was this notion that you -- if you could control the combustion process in the cigarette, you could control what's coming out.

And when you smoke a cigarette, and you take that match or that cigarette lighter and light that cigarette and you puff on it, you are generating a lot of heat, and that heat is what burns the tobacco and you get the smoke constituents.

So Wakeham suggested if we can figure out how to lower that temperature, you should get less, fewer -- maybe some things will disappear that have been a concern. So that's really where he was coming from, and that's where we were trying to go with products such as Accord.

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Q. Is this the memo you were ascribing from Dr. Wakeham?
A. That's one of them, yes.
Q. All right. Have you prepared a chart that shows what kind of compounds are formed at what temperatures when the cigarette is burned?
A. Yes.
Q. Is this it?
A. Yes.
Q. If you would, Dr. Carchman, tell the jury what this chart shows and what the theory is behind the Accord.
A. First of all, this is 1999. Many of the things on here were not known or even measurable back in the 1960s. But what this simply shows is as you increase temperature along the bottom, it is getting hotter and hotter going up here, the rate of loss of the tobacco weight, so you are burning the tobacco, you are going to generate a variety of things. And so just by point of reference, this would be 500 degrees centigrade.
A cigarette, the burning coal, you are going to get you to 900 degrees centigrade, which is approaching 2,000 degrees Farenheit. At 500 degrees centigrade, here, you can make some kind

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of a decision, the things to the right, the things that occur at higher temperatures, carbon monoxide, polyaromatic hydrocarbons, of which benzoapyrene is one. Tobacco-specific nitrosamines, these things are produced primarily at temperatures above 500 degrees centigrade.

To the left of this, again, other things are being produced, what we call tar, in quotes, sugars and nicotine come off way down here between 150 or 250 degrees centigrade. And even lower temperatures, you get water coming off.

So if you can figure out a way to control the temperature which the tobacco sees, you theoretically have a chance of reducing some of these things over here that the public health scientists would like to see diminished or eliminated.

Q. Okay. Do you have a chart that traces the development of Philip Morris' efforts to develop nonconventional cigarettes?

A. Yes.

Q. Are we going to want to refer to this again?

A. No.

Q. Is that it?

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A. Yes.
Q. If you would, Dr. Carchman, why don't you start at the beginning and just walk the jury through Philip Morris' efforts to develop nonconventional cigarettes.
A. This is the same chart we just went through. I said this is 1999, that many of the things that you do here, you couldn't do in the '60s.
So the first thing that Dr. Wakeham did was to build a group of scientists that had the necessary expertise and equipment to actually study the combustion process, real time, very sensitive instruments, and go out and hire and train the scientists.
So by 1976, this is illustrative of a prototype that heats tobacco and doesn't burn it. And what you have here is tobacco, you have a filter, you have a chamber, and you have a little heat source. This is like a charcoal briquette that you would cook a hot dog on.
Q. I'm going to get you a pointer so you can step back and not block the jury.
A. Thank you.
THE COURT: It would be helpful if the

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court reporter could see the witness speaking.

THE WITNESS: What you have here is the heat source that you are going to light a match or lighter and get this thing lit. The smoker puts his mouth here and inhales and air comes through and it is heated. It is warmed. It is moved down this chamber where some physical things happen to that air and sweeps across this tobacco. Warm air sweeps across the tobacco and sweeps off some tobacco flavors and aromas and the person would then smoke this product.

So this heats, it doesn't burn the tobacco. This was one of our first kinds of prototypes, and we called it Delta.

BY MR. COFER:

Q. Now, Delta, 1976. Did that work? Was that good enough to market?

A. No. I mean, it worked in terms of laboratory and people smoking it. We couldn't manufacture -- we couldn't figure out how to manufacture it.

And it had another issue for us, and the issue was carbon monoxide. Because we were using this charcoal briquette, we were going to generate carbon monoxide. So this thing, through this

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mouthpiece, was putting out a lot of CO, and that troubled us.

So between having difficulty in trying to manufacture this, in a consistent way, and the carbon monoxide, we continued our development efforts.

Q. What happened next?

A. Well, in terms of this series, again, this is one of those situations where we are not going to put all our eggs in one basket, but I will talk about one basket for the time being.

Q. Okay.

A. So the folks in R&D are working on this trying to figure out what to do, and then in 1987 R.J. Reynolds introduces their Premiere, which looks an awful lot like this product.

Q. Stop right there, because I don't know that -- how many of the jurors are familiar with Premiere.

Tell them about Premiere. Was it marketed? What was the reaction to it both in the scientific community, public health community, and consumers?

A. Reynolds had done an enormous amount of work on the development of their Premiere. It

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looked like this, except it had nicotine and flavors in little beads in here, and nothing was really swept off the tobacco. So it delivered nicotine and it delivered flavors and it delivered glycerine.

And they had put together really an outstanding Scientific Advisory Board, outside experts, they published a big book, they published a series of articles. I heard many of their talks at Society of Toxicology meetings around the country.

The scientific community was interested because the biological tests they were doing showed some very promising and dramatic changes. The public health community in general was dead set against us, and actually immediately called for a number of things to happen to stop this product from going out.

Q. How come?

A. They felt this wasn't a cigarette. They felt there were some health claims being made that were not warranted. It was a large "ooh" and cry that went out across this country about the Premiere product from Reynolds.

Q. Having said that, what was the reaction

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inside Philip Morris when R.J. Reynolds came out and marketed Premiere?

A. "Holy cow." Here is our major competitor in the United States that has figured out how to commercialize this product, and we were still back here somewhere in terms of having a product that actually tasted better than theirs, but we couldn't commercialize it and we still had this carbon monoxide problem.

Q. So what happened at Philip Morris next?

A. You then had to come down to Sigma. Sigma looks an awful lot like Delta, too. The major changes are instead of using charcoal, which this is, you still had the CO problem.

We went to a new heat source. We went to iron nitrate. When you lit iron nitrate, the CO went away. That was the good news. The bad news, this was now at least 16 times more complicated in terms of components than this. In fact, in the testing that we did at INBIFO with this, some of my colleagues at R&D didn't like me very much because they had to make by hand one million of these things for me to test.

So we had a product. Didn't smoke too bad. Didn't taste too bad. We got rid of the CO

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problem. We couldn't make the things. We could make it by hand. We couldn't make it in a way you could commercialize. We couldn't make it in a way that was a consistent fashion.

Q. Let me ask you this: When did Premiere go off the market?

A. Very quickly. Very quickly after that it came back in another form with another name called Eclipse.

Q. When was Eclipse introduced to the market?

A. Several years ago.

Q. Within the last four or five years?

A. Yes.

Q. And has that product been commercially successful?

A. Well, if you have read Barbarians at the Gate, which was a book made into a movie, and I think James Garner played Ross Johnson, who was the CEO -- I don't think I could use the words they used in the book.

Q. You can't.

A. But it tasted like something and smelt like something else, neither one of which you would want to put in your mouth, let alone be in a

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room with. It smelt, to me, like a burning sock.
Q. So Reynolds' product failed. Well, Eclipse is still going, but Premiere failed?
A. Yes.
Q. But you guys kept working on your product?
A. Yes.
Q. What happened next at Philip Morris?
A. So we are down here with Sigma, something that actually smokes and tastes better than Premiere and Eclipse, but we can't make it.
So the other basket that we had going was another way of heating the tobacco without burning it. That is sort of illustrated here with these two kinds of prototypes.
Q. Okay.
A. This one using a flashbulb to heat the tobacco. These are concepts. No one thought we would sell a cigarette with a flashbulb in it to heat the tobacco.
Q. If you didn't think you were going to be able to sell a cigarette with a flashbulb in it, why were you still working on developing cigarettes with a flashbulb in it?
A. It was a concept. We were trying to see

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if we could find a way of heating, maybe we could go forward. There was nothing available other than what we had.

Q. Okay. What did you do next?

A. The other prototype had like a little coil, like an emersion coil, so we could heat this coil, put electricity through here, would generate heat and then heat the tobacco. So again, control combustion, heat the tobacco, don't burn it. So we had these things going on.

And then in 1988, the Beta concept really started to move, which was the evolution of these prototypes to finding a way that allows us to control the -- heat the tobacco without burning it.

Q. And Beta concept actually has come to test market as the Accord; is that right?

A. In the United States.

MR. COFER: Your Honor, this is a time where we are going to shift into something that is going to take some time. I realize we're a few minutes early.

THE COURT: Oh. Now, would be a good time to break. It has been a long day. I appreciate your bringing that to our attention.

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Jurors, I need you at nine o'clock tomorrow ready to go. Thank you for a hard day's work. Good evening. Don't discuss the case.

Watch your step coming on out.

(Open court; jury not present.)

THE COURT: How much more on direct by estimate, please?

MR. COFER: I would guess, and it is a guess, an hour.

THE COURT: Okay. So who's on cross?

What do you expect for cross, about, and a time estimate?

MR. THOMAS: I would say probably an hour.

THE COURT: Okay.

MR. COFER: I have already advised Counsel we will call, after Dr. Carchman, Jenny Bonhomme, who is employed at Philip Morris, and I guess probably Cathy Ellis, depending on the time.

THE COURT: Okay. Anything for the

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record tonight?

MR. THOMAS: The only thing, and I'm not sure that this has been worked out or not -- Mr. Cofer, interrupt me if it has -- when the plaintiff submitted its witness list, the proximate order, at least to the best that we could figure it of our witnesses was contained on it, and then when changes were made, we told the defendants when we knew that there would be changes in the order.

Obviously, we are working to anticipate and prepare for the defendant's case to the extent we can. I just want to know if the order that we have received for the defense exhibit list is going to be the order in which they plan to call the witnesses.

I meant witness list.

MR. COFER: In answer to that, it is hard to say. We did put in a good faith list. Our thinking has changed some. I'm not sure exactly who we're going to call. We do have some scheduling problems.

What I can do, though, is, I think tonight I can sit down with the other people working on the case and see if I can come up

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with a schedule for the rest of the week. As long as people understand I'm not wed to that. I will do my best. That's all I can do.

THE COURT: All right. Does that work for you?

MR. THOMAS: Yes, we would like to get best effort on order.

THE COURT: Sure. If there is anticipated any legal matter for cross for this witness, we could take it up at 8:30 tomorrow to try to save time, maximize the time the jury can be in the courtroom.

Why don't you all come at 8:30. And then if there is something that has occurred to you overnight, we will be ready to deal with it before we bring the jury in at 9:00. Will that work?

MR. COFER: Works for me.

MR. THOMAS: All right.

THE COURT: You are all looking a little bit tired at the beginning of week four. Let's take it up at 8:30 tomorrow.

Thank you. Good night.

(Evening recess.)

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STATE OF OREGON
ss.
County of Multnomah

I, Dennis Apodaca, Official Court Reporter of the Circuit Court of the State of Oregon, Eleventh Judicial District, certify that I reported in stenotype the foregoing proceedings in the above-entitled case.

I further certify that my stenotype notes were reduced to transcript form by Computer-Aided Transcription under my direction.

And I further certify that pages 1 through 153 contain a full, true, and accurate record of my stenotype notes.

Dated this 15th day of March, 1999, at Portland, Oregon.

Dennis Apodaca
Official Court Reporter

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